INSIDE: WINDOWS 10 TIPS & TRICKS

TECH ADVISOR

NOVEMBER 2021

FROM IDG

SAMSUNG GALAXY BOOK

A PREMIUM LAPTOP WITHOUT THE PREMIUM PRICE

PLUS

GOOGLE UNVEILS PIXEL 6 LINE-UP

VISIT…

CONTENTS

NEWS

4 Intel's first high-end consumer GPU to launch as Arc early next year

6 Mouse hack highlights a problem: Hardware that pushes apps to your PC

8 This massive AI chip has the compute power of a human brain

10 AMD's chip supply will remain tight through 2021

NEWS ANALYSIS

12 What Intel has to do to make its Arc gaming GPU a win

15 Intel Alder Lake explained: How it enables a new generation of PCs

WINDOWS 10

24 Windows 10 will soon aggressively block dubious downloads

27 Windows 365: Five key differences from Windows Home and Pro

31 How to install fonts in Windows 10

34 How to enable the blue light filter in Windows 10

37 How to remote-access a Windows 10 PC
40 How to pause Windows 10 updates

REVIEWS

44 Samsung Galaxy Book
51 Acer Aspire 1 (A114-33)
58 Xiaomi Mi 11 Ultra
71 Nubia Red Magic 6R

GOOGLE PIXEL 6

84 Google unveils Pixel 6 and 6 Pro smartphones
89 4 takeaways from Google's Pixel 6 preview

SAMSUNG GALAXY UNPACKED

93 Samsung just can't quit foldable phones: Meet the Galaxy Z Fold3 and Z Flip3
98 Samsung unveils Galaxy Watch 4
103 Galaxy Buds 2 announced

Credit: Getty Images/kanawatvector

Intel's first high-end consumer GPU to launch as Arc early next year

Intel's first consumer GPU will be followed by 'Battlemage', 'Celestial', and 'Druid'. GORDON MAH UNG reports

Intel's highly anticipated consumer GPU and software will arrive under the name Arc, the company announced recently.

The first GPU will be based on its Xe HPG microarchitecture, which is expected to launch in the next few months. Future generations will use the code names 'Battlemage', 'Celestial' and 'Druid'. It didn't say what inspired the code names, but they may be an homage to Bethesda's Elder Scrolls games.

Arc will span graphics hardware, software and services, and offer "frictionless gaming and content creation experiences to gamers and creators

worldwide," Intel said.

"Today marks a key moment in the graphics journey we started just a few years ago. The launch of the Intel Arc brand and the reveal of future hardware generations signifies Intel's deep and continued commitment to gamers and creators everywhere. We have teams doing incredible work to ensure we deliver first-class and frictionless experiences when these products are available early next year," said Intel VP of client graphics Roger Chandler in a post to Intel's newsroom.

Intel has been building toward its entry into graphics for more than two years now. The company teasing in March that the first Xe HPG – now renamed Arc – would be '20 times' faster than its original Crystal Well graphics integrated graphic design.

Intel's latest foray into consumer graphics comes during perhaps the worst drought of graphics cards in the history of the PC. Fuelled by the global pandemic, a huge spike in demand for gaming and prolonged chip shortages, Intel's entry is being viewed by PC gamers as much-needed relief.

Mouse hack highlights a problem: Hardware that pushes apps to your PC

Razer is working on a patch that eliminates the problem, the researcher reports. MARK HACHMAN reports

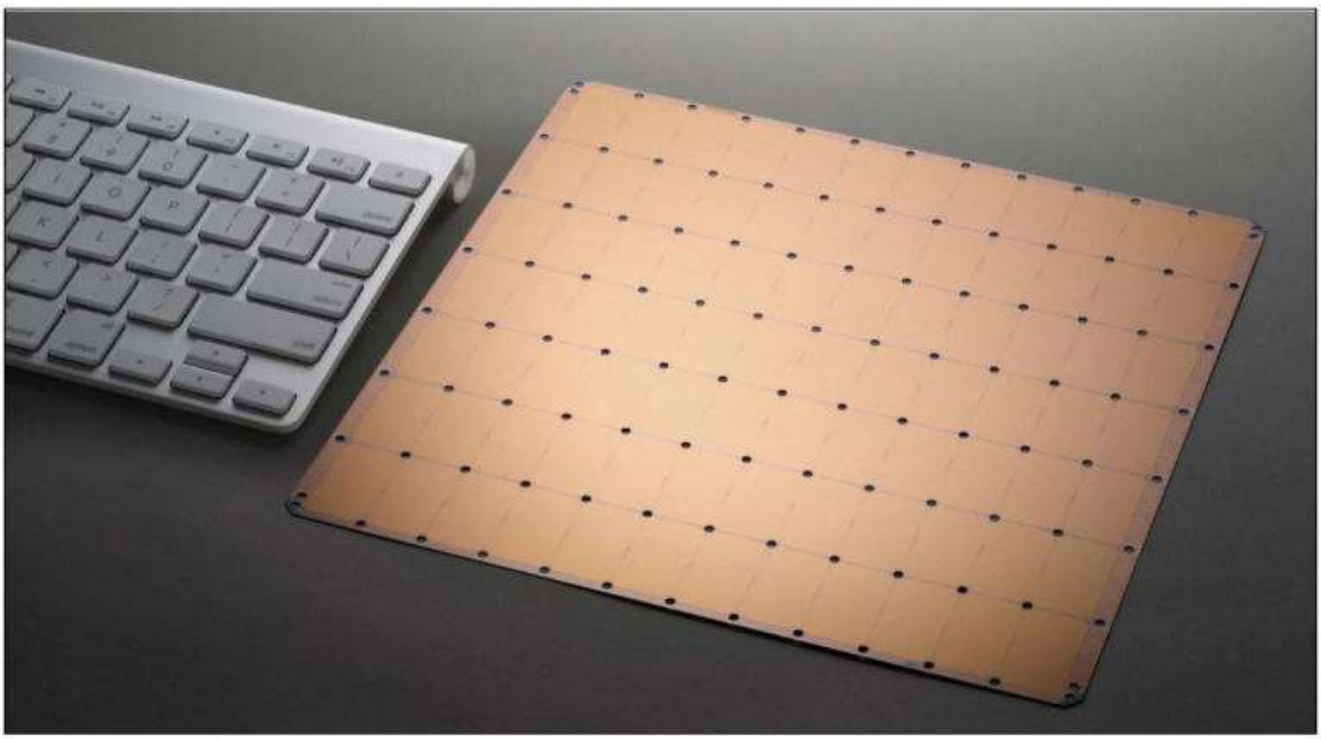
A recent 'hack' involving a Razer mouse shows what can happen if a new piece of hardware automatically downloads the required utility software: it can allow an attacker to take over a PC.

In August, security researcher 'j0nh4t' showed that the RazerInstaller utility could be used to elevate privileges on a PC, giving an attacker total control. Essentially, all a user would need to do is attach a Razer mouse, wait for Razer's

utility software to download, and then run PowerShell. Using the technique that jonh4t described in his tweet, a guest account on a PC could obtain administrator status and control the PC.

To be fair, anytime an attacker has physical control of a PC, you're at risk – that means the hacker is either seated at your desk or has stolen your laptop. The researcher also reported that Razer is busy working on a patch.

It's not clear, however, whether Razer will address the fundamental issue: yes, it's convenient for Razer to automatically push its utility to your PC. On the other hand, when that happens, you never quite know what your PC will receive. Asking the user to download Razer's utility, rather than doing it for them, might be a step toward solving that problem.



This massive AI chip has the compute power of a human brain

The Cerebras technology will be used to improve natural language processing models, Cerebras said. MARK HACHMAN reports

Cerebras Systems said today that it has achieved the computational equivalent of the human brain, or the equivalent of 100 trillion synapses.

Cerebras manufactures what it calls the Wafer Scale Engine-1 and -2, a massive 46,225mm^2 chip more like the size of a computer keyboard (see above image) than the CPU that goes inside of your PC. The company essentially mounts that chip inside of a standalone CS-2 system, about the size of a dorm refrigerator. Now, it says that it's been able to surround the CS-2 with several different technologies to enable the brain-scale computational power to

reach 120 trillion synapse equivalents, also called parameters.

Cerebras isn't alone in trying to model machine learning at the chip level, in an effort to duplicate how the human brain works. In 2020, Intel clustered 768 of its Loihi 'brain chips' together to form a 'Pohoiki Springs' cluster with the approximate power of a mole rat. In 2019, the goal for Loihi was to enable 100 billion synapses, about the computational power of a mouse brain.

The Cerebras Wafer Scale Engine Gen 2 chip is several orders of magnitude above that, as is the CS-2 system in which it is housed. While the way in which Cerebras said it achieved this level of complexity involves a number of different technologies, it essentially 'disaggregates' or separates the storage and memory from the chip's computation engine, storing the models off-chip and streaming them in. Cerebras also designed a way to provide up to 2.4 petabytes of off-chip memory for calculations, as well.

One of the ways in which the Cerebras technology will be used is in Natural Language Processing (NLP), the way in which machines interpret human speech, act upon it, and communicate the results. Essentially, what the CS2 system does is to dramatically increase the number of parameters an AI model has access to, making the AI's understanding even more sophisticated.

"Cerebras's inventions, which will provide a 100x increase in parameter capacity, may have the potential to transform the industry," said Rick Stevens, associate director of the Argonne National Laboratory, in a statement. "For the first time we will be able to explore brain-sized models, opening up vast new avenues of research and insight."

AMD's chip supply will remain tight through 2021

The company nevertheless raked in the cash last quarter. MARK HACHMAN reports

AMD's chief executive has revealed she expects the supply of AMD's chips to be "tight" throughout the remainder of the year, but are expected to ease up in 2022.

Dr. Lisa Su, speaking during AMD's second-quarter earnings call, also said that AMD is working with its own supply chain partners – makers of semiconductor manufacturing equipment – to allow for AMD "to grow substantially" as the company moves into the second half of 2021.

Su's comments were timely, given that rival Intel has warned of ongoing chip shortages as it begins navigating through

to a transition to new EUV equipment. Su did not say that AMD expected the same, though she did predict the PC market would cool off.

Specifically, Su called out how demand for PCs exploded during 2020 and in the first half of 2021, a trend AMD specifically highlighted last year. During that time, Su said, AMD captured revenue market share, or the percentage of all components sold into PCs. But the market is also expected to slow down, Su said: "From our perspective, you know, we're planning... our PC business to be about flattish first half and second half," she said.

She added that those comments accommodated issues that could crop up, such as "pockets of component shortages" – though again, Su did not clarify whether or not she was referring to a shortage of AMD components or some other part that would limit the supply of PCs. "We're taking that into account as we think about the second half of the year," Su explained.

"We remain on-track to launch next-generation products in 2022, including our Zen 4 processors built with industry-leading 5nm process technology and our RDNA 3 GPUs," Su added.

AMD reported net income in Q2 that grew a massive 352 per cent year-over-year to $710 million, with revenues that essentially doubled to $3.85 billion. AMD's Computing and Graphics segment revenue climbed 65 per cent to $2.25 billion, driven by a richer mix of Ryzen desktop and notebook processor sales. AMD also said that it sold more high-end GPUs, driving up the average selling price. AMD's Enterprise, Embedded and Semi-Custom business also soared, with revenue jumping 183 per cent to $1.60 billion. Here, AMD said that higher Epyc server processor sales contributed the most, along with semi-custom chips like the APUs that went into consoles like the Microsoft Xbox Series S/X and Sony PlayStation 5.

What Intel has to do to make its Arc gaming GPU a win

It could be a huge success, if Intel plays its cards right. GORDON MAH UNG reports

Intel Arc will be the company's first high-end gaming GPU. Will it succeed against the formidable competition from Nvidia and AMD? Start the debate with these fundamental ingredients for success that Intel should follow – starting with a good name.

GET A BETTER NAME

You need a good name to win, which Intel has already with the official branding of 'Arc' for the GPU and software around its consumer GPUs.

That's way better than Arc's code name of 'DG2 Xe-HPG', which frankly

looks like a cat ran across my keyboard. Arc is a whole lot easier to remember. Even better, it takes up only three characters, so there's more room to argue on Twitter about it.

FIX THE BORING CODE NAMES

With GPUs, you're nothing without cool-sounding code names. With Alchemist (Xe-HPG), Battlemage, Celestial and Druid, Intel is finally playing it right.

Intel has a sad history with names. Its CPUs, chipsets, and the like typically use some randomly chosen lake, river, or geographic spot located near the team that developed it. Believe it or not, they're usually chosen to be intentionally bland and cryptic.

With GPUs, it's chic to have a cool code name such as Navi, Polaris, Ampere or Pascal. Intel takes it up one more notch with what looks like character classes from a game. Nothing says nerdy but also hip like 'Druid' as a GPU code name, right? It's certainly better than 'Sacramento River' (that one's still open, Intel).

DON'T WORRY ABOUT PERFORMANCE

Breaking into the graphics game has long been risky because of the relentless onslaught from Nvidia and AMD. Shipping a GPU that can't match those two means you're a loser from day one. With Alchemist, the first Arc GPU, it's been hinted that performance is about '20X' that of the original Intel Crystal Well graphics. By our estimations, that could put it in the range of a GeForce RTX 3070.

That's far short of Nvidia and AMD's best or even second-best. But this time, it just may not matter at all, even if Intel's best discrete GPU duels with Nvidia's 5th-tier GPU and AMD's 3rd-tier GPU. For the first time in the history of PC gaming, being faster isn't the only thing that matters for GPUs. It's also about being able to buy it.

JUST SHIP, BABY

The most important thing to gamers right now isn't how fast your new GPU is – it's about being able to buy one. In a world where people pay MSRP for a five-year-old used graphics card, being able to buy an Arc GPU is enough to make it a raging success. So yes Intel, just ship it, and ship it on time, to win.

I'm actually sad Arc won't ship this holiday – we have to wait until Q1 of 2022. It doesn't look like the GPU supply will improve by then, but six months is a long time. God forbid Arc gets delayed any further, giving Nvidia and AMD more time to build up supplies. If by March, you have a choice between AMD, Intel

or Nvidia GPUs, the conversation will go back to performance, performance, performance – not just having a pulse.

BE THE DISRUPTOR

The fact that people will pay above MSRP for used graphics cards might tempt Intel to price it for 'what the market will bear'. If the GPU drought is still bad in early 2022, then yes, charging the price of a GeForce RTX 3070 for the first Arc will likely mean the cards will still sell – and likely sell out. But that doesn't build brand loyalty nor excitement.

Intel has long had to deal with Nvidia and AMD disrupting its key businesses, so why not take the time to play a little payback and finally screw up their game? That means taking a slight loss or less profit on the cards to win the optics war of looking like Intel GPUs are the PC gamer's best friend.

RESIST BUNDLING

Intel has long had a one-stop shop approach to business, so companies can buy the CPU, the chipset, the Wi-Fi controller in a bundled deal. Hey, so why not buy the GPU too? That makes great business sense and locks in PC makers happy to get supplies of GPUs.

Unfortunately, starved PC gamers would only be enraged by such a move. Getting as many GPUs into the hands of gamers directly will make Intel everyone's hero and pay off dividends in the long run by making people believers.

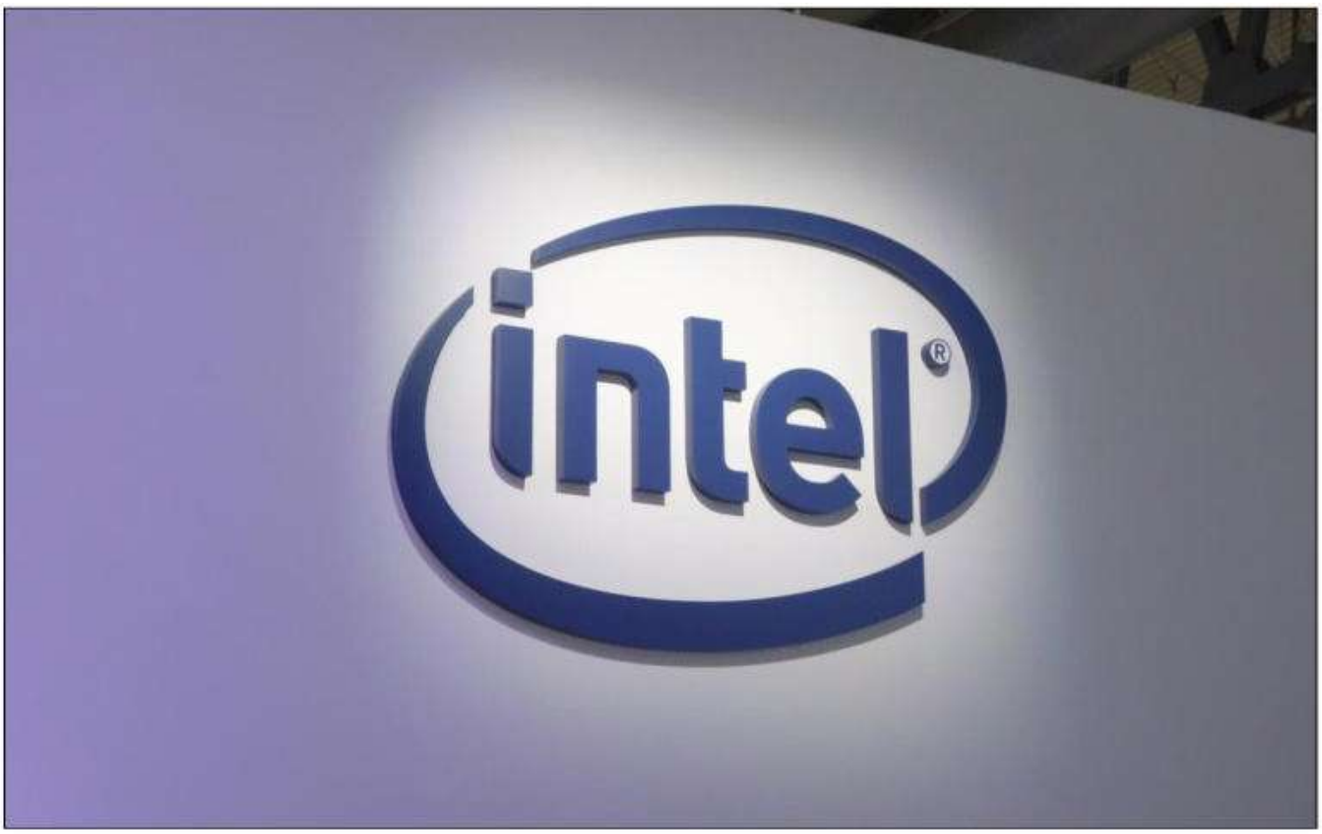
GET THE DRIVERS RIGHT

Intel actually has a long driver history with gamers – it's just never been a good history. Having a reputation for reliable, high-performance drivers that fix bugs immediately, not three months from now, is as important as the hardware itself.

EXECUTE

If Alchemist ships as a winning story early next year – don't get off the gas. Nvidia and AMD execute on new GPUs with the reliability of a Casio G-Shock sports watch. With a new competitor, both will likely step it up even more so.

The execution of Battlemage, Celestial and Druid will matter as well. Gamers will see slipped launches as failure. Intel has apparently already locked in access to leading-edge manufacturing (at TSMC, no less), so it looks like Intel is planning ahead



Intel Alder Lake explained: How it enables a new generation of PCs

It's built specifically with Windows 11 in mind. MARK HACHMAN reports

Intel's next PC microprocessor, Alder Lake, marks a radical change for Intel. Its first mainstream Core hybrid processor mixes 'performance' and 'efficiency' engines to deliver either performance or longer battery life when your PC needs it most.

According to Intel, Alder Lake is due "later this fall", most likely as a 12th-gen Core chip. Intel will manufacture three versions of Alder Lake – one for the desktop, and two more for laptops – with up to 16 cores and 24 threads. Alder Lake will also mark Intel's introduction

of PCI Express 5 and DDR5 memory, executives said at last month's Intel Architecture Day.

Interestingly, Intel has co-designed with Microsoft a special thread scheduler, destined for Windows 11, that will optimize performance. Desktop and laptop PCs with Alder Lake inside them should mix and match higher performance where it's needed and offer longer battery life, as Intel continues to get better at assigning the right processor core for the right task. The company says its performance core should deliver 19 per cent more performance than today's 11th-gen 'Rocket Lake' desktop chip.

The bottom line? It's probably fair to say that a major overhaul of the Intel Core PC is in the works for this autumn.

WHAT IS ALDER LAKE?

Alder Lake, Intel's next-gen Core architecture, will ship this autumn, inside desktop and mobile PCs. Intel will offer one two-chip socketed desktop processor, plus two mobile chips: one for mainstream PCs, and one for thin-and-lights and tablets. They're all built on Intel's newly-renamed Intel 7 process, from 9-watt tablets to 125-watt desktops.

Alder Lake configurations will look like this, below. (Intel also uses the term 'P-Cores' to describe performance cores, and 'E-Cores' to describe the low-power efficiency cores.)

Desktop: 8 performance cores, 8 efficiency cores
Mobile: 6 performance cores, 8 efficiency cores
Ultramobile: 2 performance cores, 8 efficiency cores

A summary of Intel's Alder Lake chip. Note that hyperthreading, a staple of most modern PC microprocessors, is available only on the performance cores.

When Intel first disclosed Alder Lake in August 2020, we knew then it wouldn't be a traditional Intel processor. Inside are two types of processing cores: a 'performance' core that will turn

Intel's Alder Lake chips will be manufactured for three different classes of PCs.

on for applications like games, and an 'efficiency' core used for background tasks, such as email syncing.

Arm has used this hybrid approach for many years, and the niche Intel Lakefield processor did as well. Neither excelled at performance. Raja Koduri, Intel's senior vice president of its AXG group, sought to differentiate Alder Lake, calling it a 'performance hybrid' – think Ferrari SF90 Stradale rather than Toyota Prius.

Alder Lake does not use Arm cores. Intel's 'performance' cores use Intel's traditional 'Cove' CPU design, and the efficiency cores use Intel's Atom design.

Intel Architecture Day was for chip nerds. We'd expect Intel Innovation, a show Intel will hold on 27 October as a replacement for the venerable Intel Developer Forum, to answer the questions that chip buyers will want answered: how fast Alder Lake will run, the branding and model numbers, and how much these chips will cost.

MAJOR CHANGES COMING WITH ALDER LAKE PCS

We already know of major changes affecting how Alder Lake PCs will be built, especially by DIY PC builders. For one, Alder Lake's desktop processor will use an LGA1700 socket, an open secret that has surfaced as board makers and chip cooler makers design around the new chip. The larger LGA1700 socket replaces the standard LGA775 socket used for well over a decade in the PC space, which means you'll need to buy a new motherboard and cooler if you're building an Alder Lake PC.

Alder Lake also uses a hybrid physical memory interface that supports four different memory types: DDR4-3200, LPDDR4x-4266, and also the brand-new DDR5 technology and its DDR5-4800 and LPDDR5x modules. (DDR5, a new memory technology developed in 2017, has been in the works for years, though it's arrived a bit later than expected.) Arik Gihon, the chief architect of Alder Lake, told attendees that Alder Lake will be able to clock the memory speed up or

down, saving power, in response to real-time heuristic analysis of the work being performed. Intel's Alder Lake will offer you the option of buying new, hotter, more expensive DDR5 memory, but you should also have the option of reusing your older PC memory.

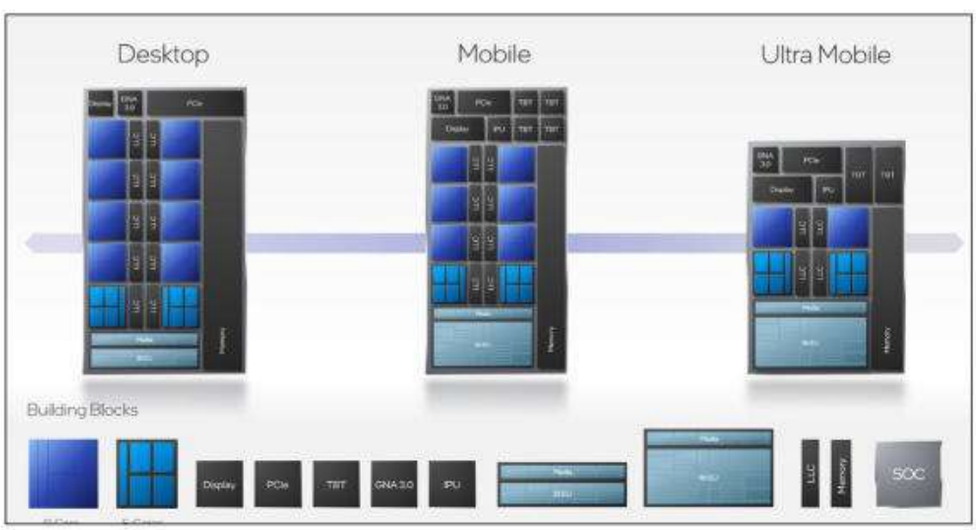
Just as your car's engine is really a collection of individual parts, so are Intel's 'chips' becoming a collection of individual logic blocks packaged together in various ways. Gihon referred to them as "building blocks", and showed off some of the unexpected differences between the desktop and the mobile chips. In the diagram below, for example, you can see that the desktop Alder Lake chip lacks Thunderbolt capabilities and has a smaller number of integrated graphics cores than the mobile Alder Lake chips do.

Finally, Intel's Alder Lake will include Intel's first support for PCI Express 5, announced in 2019. PCIe Gen 5 supports up to twice the bandwidth of PCIe 4, or 64GBps across 16 lanes. That, of course, will be likely gobbled up by both graphics cards and SSDs. An early snapshot of the Alder Lake chipset shows it offering x16 PCIe Gen 5 for graphics cards and a x4 connection to PCIe Gen 4, for SSDs.

Alder Lake's overall performance remains somewhat of an open question. Remember that Intel's first attempt at a hybrid processor architecture, Lakefield, came and went with reports of poor performance. We do have the first inkling of how Intel's performance core will perform, however.

INTEL'S NEW PERFORMANCE CORE

Intel's 'performance core' or 'P-Core' is essentially the legacy of its Core



According to Daniel Rogers, the product manager for Alder Lake, the presence of fewer Xe EUs (32, as opposed to 96) on the desktop processor assumes the presence of discrete graphics. Note that Alder Lake supports up to four Thunderbolt 4 ports as well as Wi-Fi6e.

chips, carried forward into Alder Lake. We often refer to Intel's microprocessors by their code names – Skylake, Rocket Lake – but Intel has its own internal code names for just its CPU cores, too: the little-used 'Sunny Cove' code name, for example. Officially, this is 'Golden Cove', but you'll see it referred to merely as just a performance core. But, according to Intel's Koduri, this is the core that's designed for pure speed.

New
Performance
x86 Core
A Step Function in CPU Architecture Performance For the Next Decade of Compute
A significant IPC boost at high power efficiency
Wider
Deeper
Smarter
Better supports large data set and large code footprint applications
Enhanced power management improves frequency and power
Machine Learning Technology: Intel® AMX – Tile Multiplication
All in a tailored scalable architecture to serve the full range of Laptops to Desktops to Data Centers
intel.
An overview of Intel's performance core within Alder Lake.

According to Yadi Goaz, the director of the Intel Core CPU architecture, the performance core was designed to step up in general single-threaded CPU performance, but also anticipate the needs of AI and other functions in laptops, desktops, and servers. Intel solved the latter problem with a new AI matrix engine coprocessor. It has a new smart power management controller, too.

While Goaz delved deep into the intricacies of the design, there are a few broad takeways: the P-Core is essentially wider and deeper than before, with the ability to perform better branch prediction for applications with a lot of code. The chip's caches have been improved to better accommodate data misses. The performance core also integrates a new microcontroller that can examine the needs of applications in a microsecond, even faster than a millisecond. "The result is higher average frequency for any given application," he said.

Goaz said Alder Lake's performance core will offer a 19 per cent improvement over the 'Cypress Cove' core found in Rocket Lake, based on a variety of conventional, current benchmarks: Spec CPU 2017, Sysmark 25, PCMark 10, and more. That comparison is based on running both chips at the same frequency, 3.3GHz. "This level of improvement is even greater than what

we delivered with the Sunny Cove core over the Skylake core," Goaz said.

At August's Hot Chips conference, Intel executives said the P-Core offers 50 per cent more performance over the E-Core, according to the AnandTech live blog of Intel's presentation.

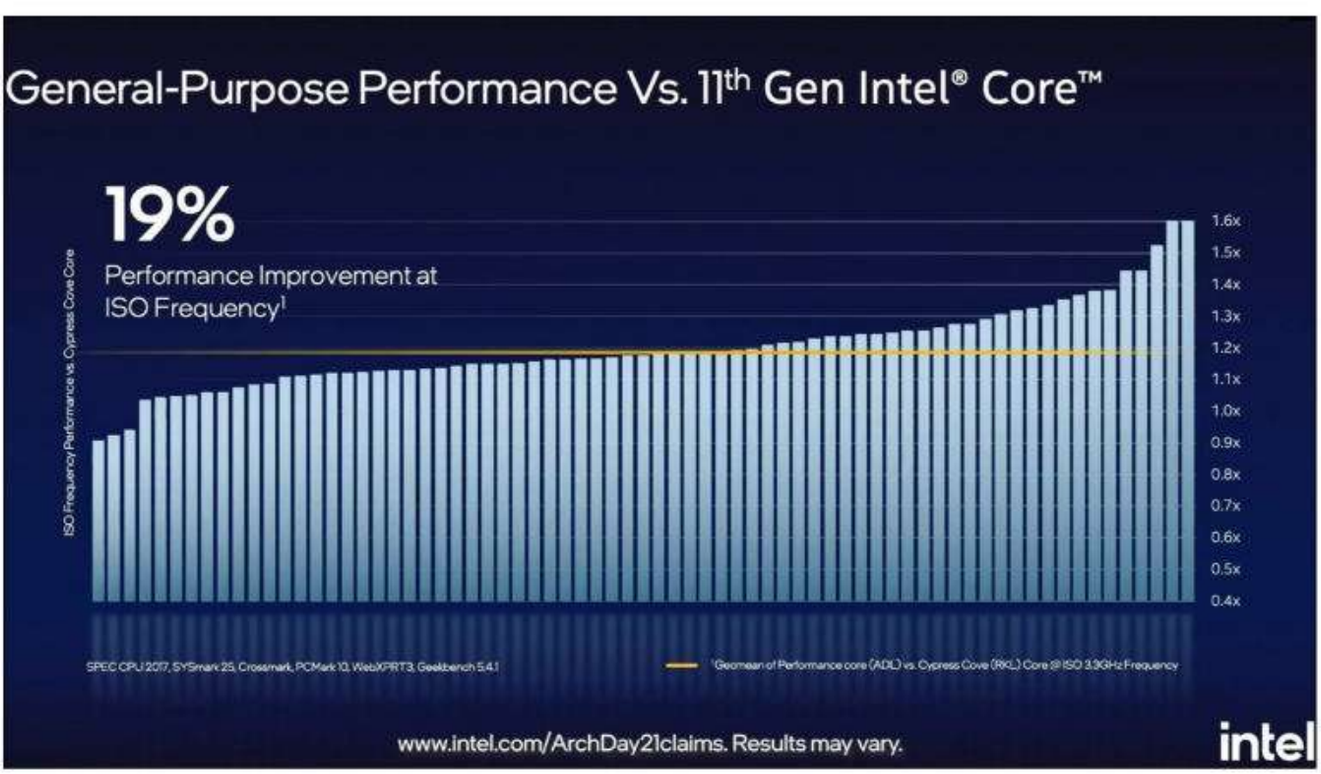
For new applications, Intel developed a set of new instruction extensions, called Advanced Matrix Extensions, or AMX. AMX was designed for machine learning/AI, both of which have become selling points for hardware for the data centre.

Why even develop desktop Alder Lake chips with efficiency cores,? "You're absolutely right – battery life doesn't matter in desktop," said Stephen Robinson, a CPU architect and Intel fellow. "But the thermals do. Fans, cooling power – at some point, you have a limit."

And that's why Intel designed its new efficiency cores.

INTEL'S NEW EFFICIENCY CORE

The first thing you need to know about Intel's efficiency core is that... well, it's a performance core, too, of a sort. Formerly named 'Gracemont', the Intel efficiency core is essentially a fourth-generation Atom chip that lacks the hyperthreading capabilities of the Intel performance core. "Our



This is how Intel views the performance of its performance core within Alder Lake.

primary goal was to build the world's most efficient X86 core, while still delivering more instructions per clock than Intel's most prolific architecture to date," Robinson said.

That architecture was the sixth-generation Intel 'Skylake' chip, and Intel's efficiency core apparently supersedes it in every way. Four of the E-Cores (also manufactured in Intel's Intel 7 process) take up the die space of a single Skylake core.

An overview of Intel's efficiency core within its Alder Lake chip.

The new E-Core also delivers 40 per cent more performance than Skylake. If you put four E-Cores against a dual-Skylake system using four threads, you'd still get 80 per cent more performance with less power, Robinson said. "We exceed Skylake Core performance by consuming less power in a smaller footprint," he added.

INTEL THREAD DIRECTOR: HOW IT ALL FITS TOGETHER

Intel's Thread Director is a thread scheduler, a sort of traffic cop in the operating system, ensuring that high-priority operations are dealt with first, and making sure that a microprocessor isn't starved for data. Now, with Alder Lake, the question becomes: Which task goes first, and on which processor core type should it run?

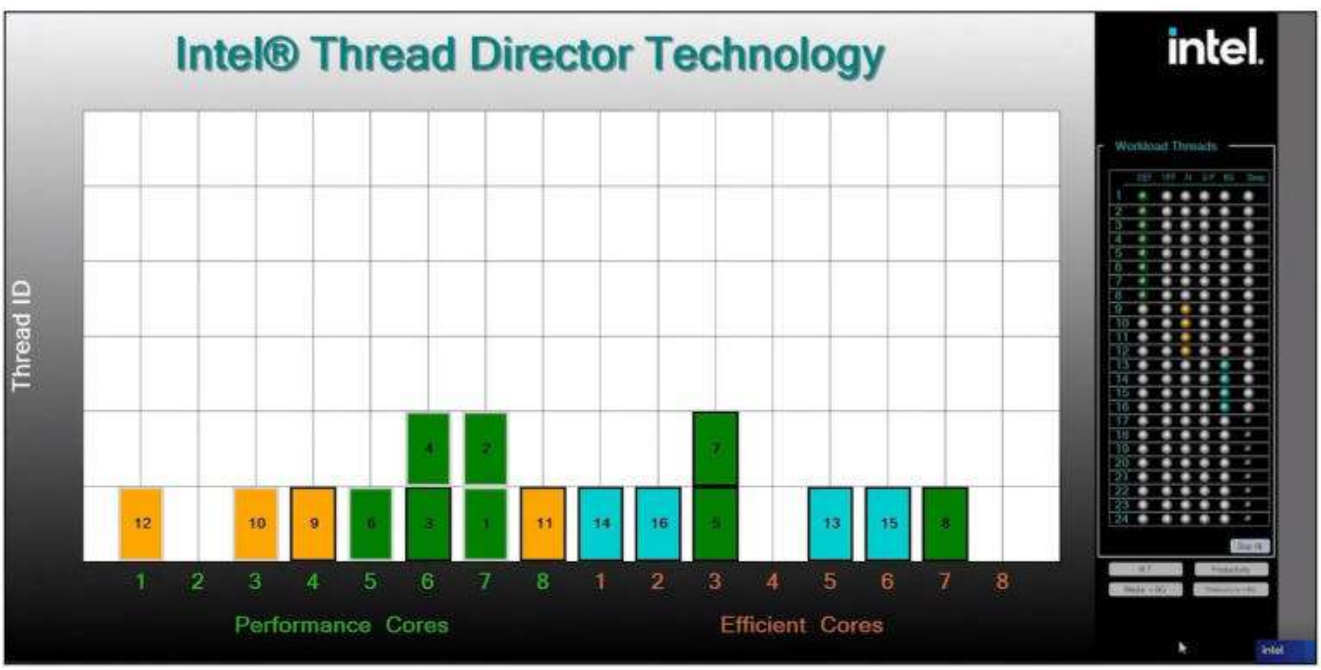
That's the job of the Thread Director, an Intel-designed scheduler specifically designed for Windows 11. Until now, apps running in the foreground (such as the web browser you're using to read this story) were assigned the highest priority.

Thread Director goes a step further, analysing the performance needs of each thread, assigning them to the right type of core – and then re-assigning them on the fly if new threads appear. Rajshree Chabukswar, the senior principal Intel engineer in charge of the effort, said Thread Director will manage common consumer tasks like gaming, gaming and streaming, productivity apps, and more. Because Intel Thread Director is running

in hardware, not software, developers won't have to try to assign these priorities themselves.

There may be scenarios where the E-core offers higher performance than the P-Core, and when the P-Core is actually more efficient. The actual frequency these cores will run at will be adjusted by the compute load, and balanced between the different core types. Background threads will run at a low clock frequency, and high-priority threads will run at a higher frequency, Intel said at the Hot Chips conference. All AI workloads will be assigned first to P-Cores, according to the AnandTech live blog.

Some questions remain. For one, there's the timing: According to Chabukswar, Thread Director support will be incorporated into the "upcoming Windows 11 release", implying that Windows 11 should support Alder Lake at launch. But it's still not clear whether Windows 10 will enjoy the same support. Chabukswar said there's still "hybrid goodness" with Windows 10, but added that Windows 11 will provide the ability to dynamically shift threads back and forth between performance and efficiency cores. It sounds like Windows 10 may lack that capability, making the combination of Windows 11 and



Intel Thread Director can dynamically reallocate threads between the available performance and efficiency cores. Here, you see some high-priority (dark green) tasks running on the efficient cores, and some medium-priority tasks running on the performance cores. It's up to Thread Director to reassign these.

Alder Lake that much more efficient. "The ordering of thread scheduling and other things are taken care of in Windows 10," he added. "Windows 11 takes it to the next level."

Chabukswar also implied that Alder Lake will run differently on Windows 10 versus Windows 11, but it might not be as straightforward as higher performance scores. Instead, she said a Windows 11 system with Thread Director enabled may be more efficient in bouncing tasks back and forth between the performance and efficiency cores. The results may be hard to quantify: With low-priority tasks handed off to E-cores, will performance improve as the P-Cores are freed up? Or will battery life lengthen? It may all take some testing.

Intel said nothing about Meteor Lake, the eventual successor to Alder Lake. It did, however, close out its Intel Architecture Day with a message from its new chief executive, Pat Gelsinger, reminding everyone to attend Intel Innovation on late October. Could this be a launch party for Intel's Alder Lake laptops? We hope so.

Credit: Getty Images/kanawatvector

Windows 10 will soon aggressively block dubious downloads

You'll have the option to allow helper apps on your PC, but Microsoft will tell you when they're a bad idea. MARK HACHMAN reports

Windows 10 will begin blocking 'potentially unwanted applications' – bundled apps that you probably don't want – by default, Microsoft says, beginning in early August. The change was announced in a support document – fave.co/389zoWO.

If you download a lot of third-party utilities, you may already have run into a potentially unwanted application (PUA), also called a potentially

unwanted program (PUP). The terms most often describe a bundled piece of adware, or – worse – a small additional application that slowly mines cryptocurrency in the background.

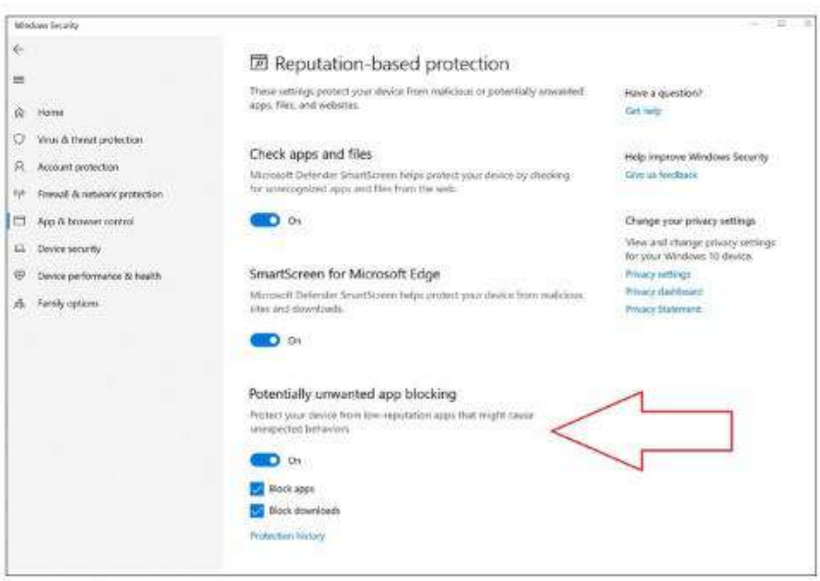
You might not even know where the PUA comes from. Sometimes it might be the developer itself that added the PUA for additional revenue, or a site that aggregates the utilities and provides them for download. Either way, the PUA is an app you never asked for and probably don't want.

Microsoft is becoming slightly more aggressive in how it treats PUAs. Microsoft already offered you the capability of automatically filtering PUAs as part of the Windows 10 May 2020 Update, though it was off by default. "Starting in early August 2021 we'll begin turning it on by default to make it easier for you to keep your systems performing at their best," Microsoft says.

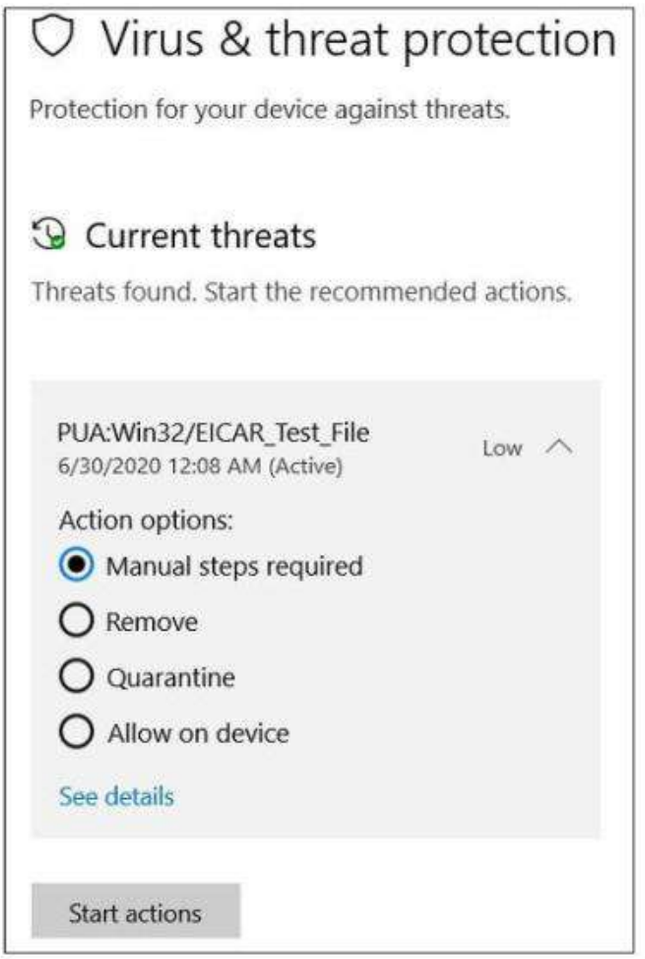
Filtering apps, of course, can lead to errors. After all, you might want to download a cryptominer to generate a bit of extra income, or an app that distributes updates via an attached BitTorrent client that you're aware of and accept. If that's true, you can still toggle what Microsoft calls "reputation-based protection" on and off inside the Windows 10 Settings menu. Go to the Windows Security app via the Windows 10 Settings menu or Windows 10 search box, then to App & browser control > Reputation-based protection.

Under Potentially unwanted app blocking you'll see two toggle options, Block apps and Block downloads. Both have similar functions. Block downloads works at the browser level, but only with Microsoft Edge. Block apps would be used to fend off apps before download within Chrome or another browser, because Windows Defender will examine those apps only after they've been downloaded.

You'll also see a 'master' toggle switch to turn of reputation-based



Here's where you can find the Windows 10 reputation-protection settings.



Microsoft will quarantine the PUA if it detects it. There, you'll have the option to delete it, leave it in an isolated 'quarantine' state or allow it on your system.

protection entirely, though it's not recommended. As of this month, the reputation-based protection will be on by default.

Note that turning on Block apps or Block downloads won't block all apps or downloads, just the ones that Microsoft deems suspicious. Microsoft will quarantine any PUAs it detects and let you choose whether to go ahead and install it on your device. Microsoft is simply using what it knows about the app to let you know gently that it might not be a good idea.

Credit: Getty Images/Denis Isakov

Windows 365: Five key differences from Windows Home and Pro

Microsoft's new enterprise offering presents stark contrasts with the consumer Windows versions. MARK HACHMAN reports

Microsoft has released Windows 365 business pricing, telling us a little more about what its 'PC in the cloud' will cost. Right now, this cloud-based version of Windows is an enterprise product, but it's not beyond the realm of possibility that a version of Windows 365 will eventually land in consumer PCs. But what then? Windows 365's business plans give us some hints.

If nothing else, any curious Windows user should be looking at Windows

365 for glimpses of where Microsoft is taking the broad Windows platform and Cloud PCs.

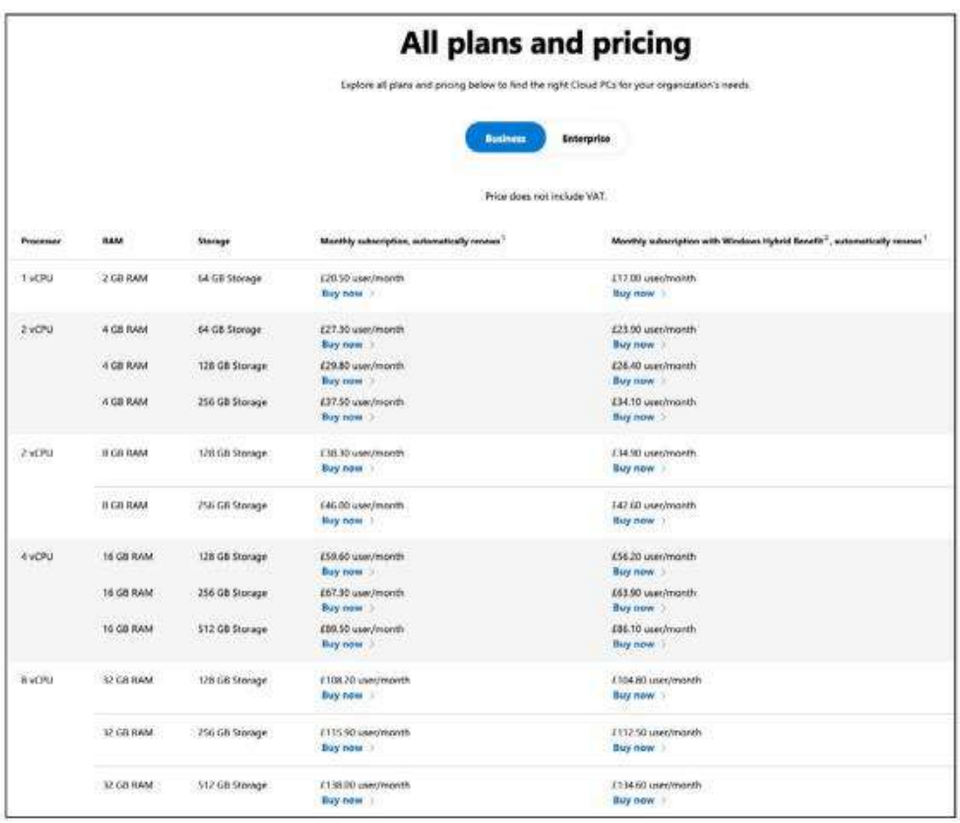
Microsoft isn't afraid to migrate its products to and from the cloud, both for enterprise and consumer users. Exhibit A: Microsoft 365 (once called Microsoft Office) runs on your PC, the web, and mobile apps. Exhibit B: Microsoft has already made a 'Cloud Xbox' accessible to consumers, as part of Xbox cloud gaming.

And now we have Windows 365, which simply puts a virtual PC in the cloud. This could also be a natural fit for consumers, especially considering the broader trend in computing to put software and services in the cloud.

Microsoft's Windows 365 pricing should evoke some sticker shock. Microsoft said it would charge businesses at least £20.50 per user per month for Windows 365, all the way up to £138 per user per month for a powerful 'Cloud PC'. Obviously, businesses will be footing this bill, as part of either Windows 365 Business or Enterprise plans. But let's look past the pricing and parse Microsoft's fine print. It includes some interesting details on how Windows 365 differs from the Windows on your desk.

'HYBRID BENEFIT' ENTAILS DISCOUNTS FOR WINDOWS 10 USERS

Microsoft has published a long list of Windows 365 pricing and configurations on its website – see fave.co/3jhKpMi. While the prices are far above what consumers would ever tolerate the



Microsoft's Windows 365 pricing.

pricing tells us Microsoft will offer a discount to those that already own a Windows 10 PC or licence.

Microsoft calls this a "Windows Hybrid Benefit", and it knocks off up to 16 percent of the monthly fee if you already own Windows 10 Pro on a PC (the Home version isn't included). There are two kickers: First, your PC must be your primary work device, according to a Windows 365 FAQ (fave.co/3mugKkX). Second, you must access the Cloud PC from the Windows 10 PC at least once per 'term', or month. (There's really no secret to what a Cloud PC is – imagine opening up an app on your phone and seeing a Windows desktop. It's that simple.)

There is some precedent for Microsoft offering discounts to loyal customers: Microsoft Rewards and Microsoft's Bing Rebates shopping programs already offer you real cash back for using Microsoft's services. So, a flat discount for Windows 10 owners doesn't seem unusual.

MICROSOFT'S OUTBOUND DATA CAP

If you're a Windows 365 Enterprise user, any data that you access outside of Microsoft's services falls under Microsoft's complex data licensing plans (fave.co/38aYfcP). If you're a Windows 365 Business user, however, you'll have an actual data cap for upstream traffic: 20GB per user per month on the cheapest plans, all the way up to 70GB per user per month on the high end.

The data caps will have big ramifications for enterprise computing, but let's remember the typical home PC download far more data than it ever uploads. This is one reason why cable broadband favours enormous downstream bandwidth, but a relatively small amount of upstream bandwidth. Data caps stink, but these might not affect consumers much if Windows 365 ever hits the mainstream.

NO CLOUD PC DOWNGRADES FOR NOW

Windows 365 Enterprise customers (but not Windows 365 Business customers) can 'Resize' their Cloud PC, virtually upgrading virtual CPUs, memory and storage with just the press of a virtual button. But you can't downgrade that Cloud PC, however, at least for right now.

Were Windows 365 to become a consumer offering, Microsoft would have to adjust its terms. Microsoft adores recurring subscription revenue (which big tech company doesn't?), and consumers may be willing to suffer an ongoing payment to tap a PC in the cloud – especially if that Cloud PC is more powerful than any physical PC may buy.

But consumers will also scream, shout, and drag their heels if Microsoft forces them to pay for more service than they actually need. Just imagine not being able to downgrade your streaming video subscription or cable broadband tier. For the consumer market, Microsoft would do well to offer a period of time to 'back out' of a resized Cloud PC.

ONE USER, ONE CLOUD PC

Microsoft's Cloud PCs offer a variety of configurations, starting at one virtual CPU, 2GB of RAM, and 64GB of storage for £20.50 per user per month. Microsoft isn't saying what the 'virtual' CPUs are, incidentally. Microsoft isn't even specifying if you're buying a dedicated virtual CPU, or sharing it with another Cloud PC.

Microsoft makes clear, however, that only one user is allowed on one Cloud PC. One can only speculate how this policy may be applied to a consumer platform, but for now, it's in the Windows 365 spec.

SAY GOODBYE TO YOUR CLOUD PC DATA IF YOU CANCEL

This part is scary: "When a [Windows 365] subscription is cancelled, all associated data will be deleted."

Microsoft will hold on to your data for 30- to 180 days, depending on the scenario, but after that, any data on the Cloud PC will vanish. And, yes, we would expect that if Cloud PCs come to the consumer space, Microsoft will give you some way to migrate your data off of the Cloud PC. But if nothing else, Microsoft's stipulation is a harsh reminder that sometimes the cloud isn't always the best place to store data.

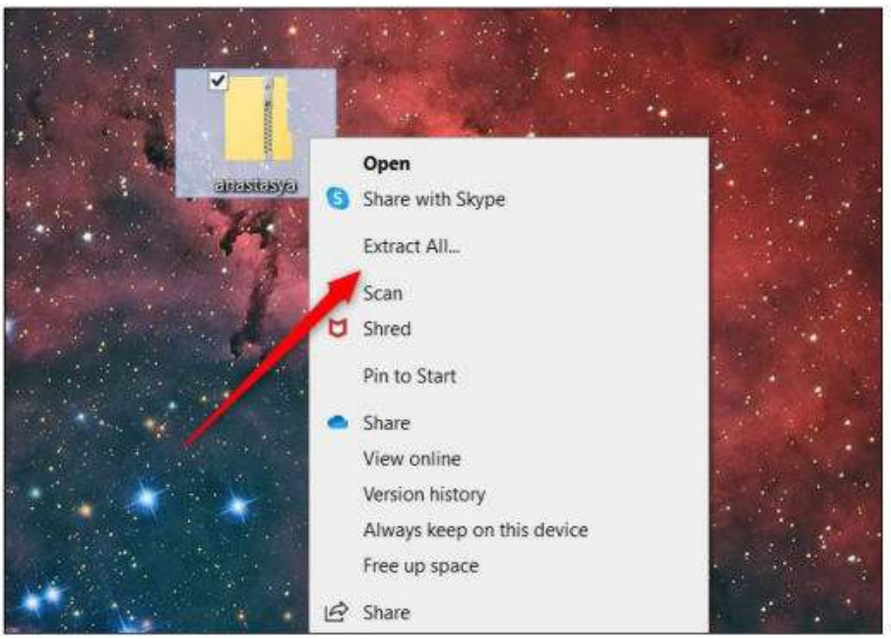
How to install fonts in Windows 10

You have several ways to install fonts, all straightforward. MARSHALL GUNNELL reports

Windows 10 comes preloaded with a number of different font types (based on which language package you're using), but you can also find a ton of different types of fonts (both free and paid) online. Installing these fonts on your Windows 10 PC is pretty simple. Here's how.

INSTALL FONTS USING THE SOURCE FILE

You can quickly install a font using the font file's context menu. When you download a font from the web, more often than not the files come in compressed ZIP folders. In this case, unzip the compressed files by right-



Click the Extract All options from the context menu.

clicking the folder and then selecting Extract All from the context menu.

Next, decide where you want to unzip the files. Click Browse in the window that appears to open File Explorer.

Once File Explorer is open, choose the location you want to unzip the files.

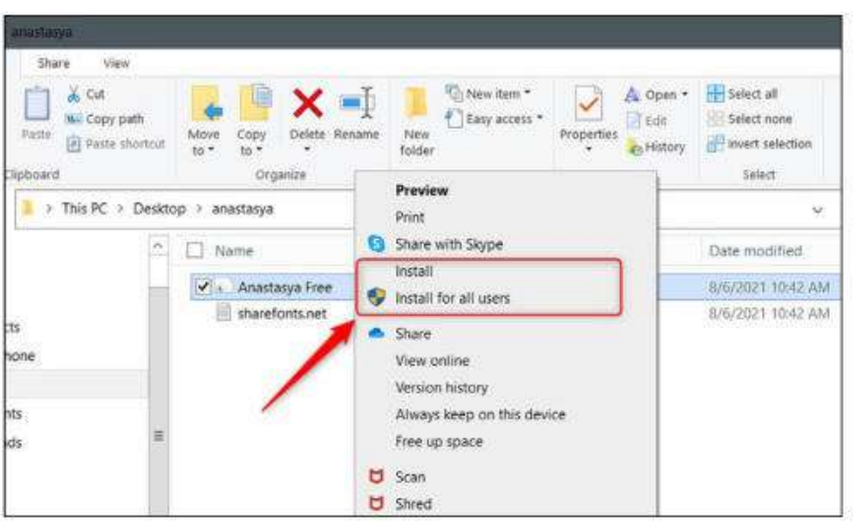
Once ready, click Extract. Open the folder that contains the unzipped files and right-click the font that you want to install. Click Install from the context menu to install the font on your user account, or Install for all users to install the font on all user accounts.

The font will begin installing. The installation process will only take a few seconds.

INSTALL FONTS FROM CONTROL PANEL

Another popular way of installing fonts on your Windows 10 PC is by using Control Panel.

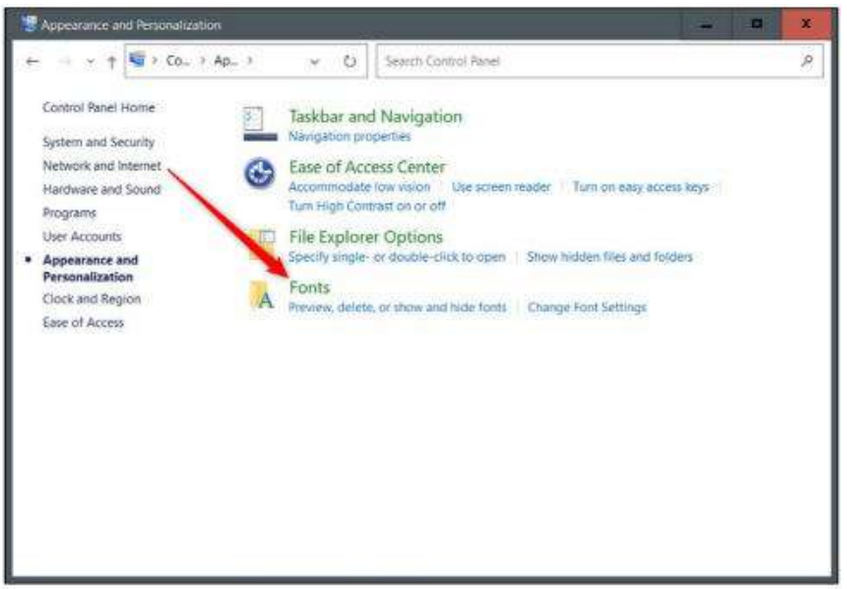
Open Control Panel by typing control panel in the Windows Search bar and then clicking the Control Panel app from the search results.



Install the font for your user profile or for all users.

In Control Panel, click Appearance and Personalization. Next, click Fonts. You'll now see a large library of fonts currently installed on your computer.

To install a new font, drag and drop the font file



Click Fonts to see your font library.

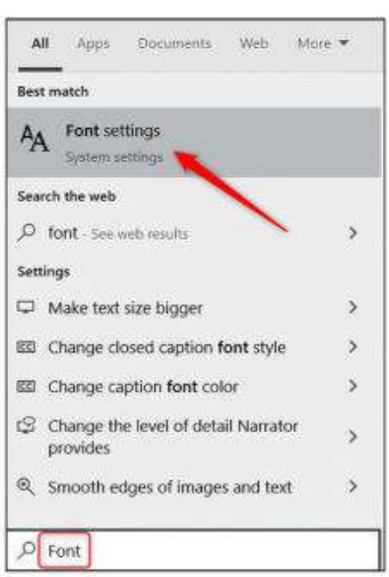
in the font window. After a few seconds, the font will appear in the library. Once it appears, the font is successfully installed.

INSTALL FONTS FROM THE SETTINGS APP

Microsoft provided the ability to install from the Settings app in its Windows 10's April 2018 update. Instead of digging through multiple levels in the Settings app to search for the Font options, just type font in the Windows Search bar and then click Font settings from the search results.

The Fonts options will open in the Settings app. Drag and drop the font file that you want to install into the Add Fonts section. The font will begin installing. The installation process takes only a few seconds.

As you can see, the process for installing fonts is relatively straightforward, and there are a few different ways to do it. If you want to take your font game to the next level, you can even make your own using Microsoft Font Maker. Give it a shot.



Search for Font settings in Windows Search.

Credit: Getty Images/PIKSEL

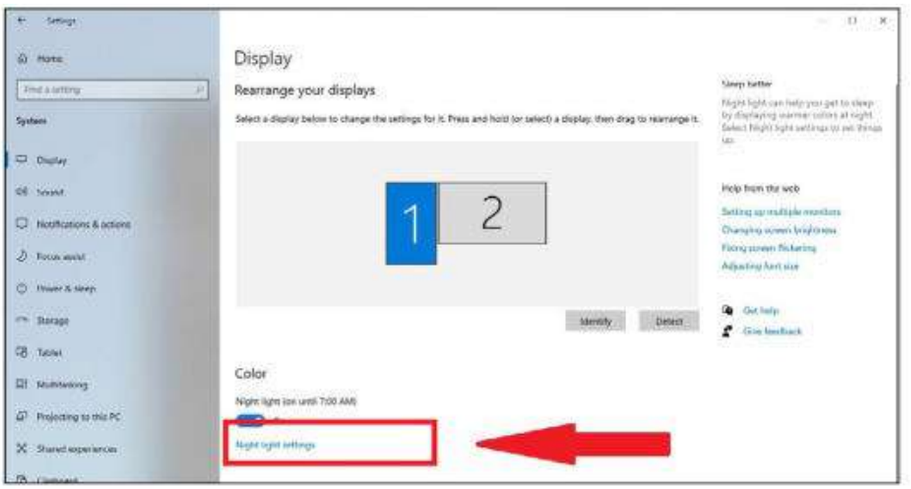
How to enable the blue light filter in Windows 10

You can keep it on for continuous blockage, or instead choose to limit the filter to specific hours. ALAINA YEE reports

We've all read the reports: Blue light can play a role in sleep issues. It's also been mentioned as a factor in skin damage, too. Fortunately, not only can you enable a blue-light filter on your smartphone, you can do so in Windows 10, too. In fact, the process is incredibly easy – set-up takes just a few minutes. Here's how to do it.

STEP 1

Click on the Start menu (or tap the Windows key on your keyboard). Then type in 'Night Light' to bring up a direct link to that setting.



Jumping into the Night Light settings via Windows 10's robust search feature is easiest, but if you go the manual route, here's where to find the link to that setting.

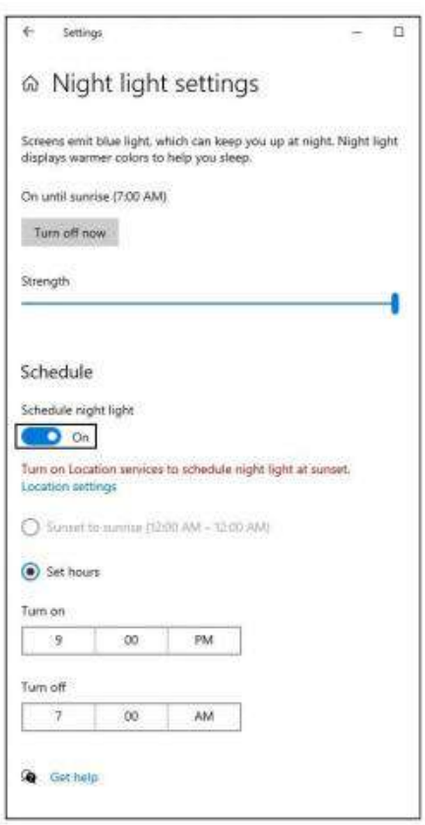
Alternatively, you can go to Start > Settings > Display, then click on Night light settings under Color (see image above). If you take this route, you can turn Night Light on and off via a toggle on the Display settings page.

STEP 2

Click the Turn on now button to immediately activate blue-light filtering. Move the strength slider to increase or decrease how much blue light Windows 10 will eliminate. Never used a blue-light filter before? Before turning on Night Light, you can first play with the strength slider for a preview of what your screen will look like at various intensities – it'll essentially let you try before you buy.

You can also instead click the grey toggle for Schedule night light to restrict the blue-light filtering to specific hours. Customize a time span for when the blue-light filtering is on, and you're all set to go. Windows can also base the schedule on your location's periods of actual sunset. You'll just need to turn on Location Services for that to work – if your system has that setting off, a link to Location settings will automatically appear.

That's it. You're done.



An example of what Night Light settings look like when the feature is active and a daily schedule is set.

MORE OPTIONS

For most people, Windows 10's built-in blue-light filtering does a good job. But for more control, you can turn to a third-party app. We recommend f.lux, a free program that provides more exact blue-light filtering settings and a rolling schedule for day and night time intensities.

Windows 10's Night Light only has two options: It's either on, or it's off. With f.lux, you can have a less intense amount of blue-light filtering during the day, and then have that transition to a much deeper blockage. The program will even do that for you automatically if you choose, based on your type of in-home lighting and your location.

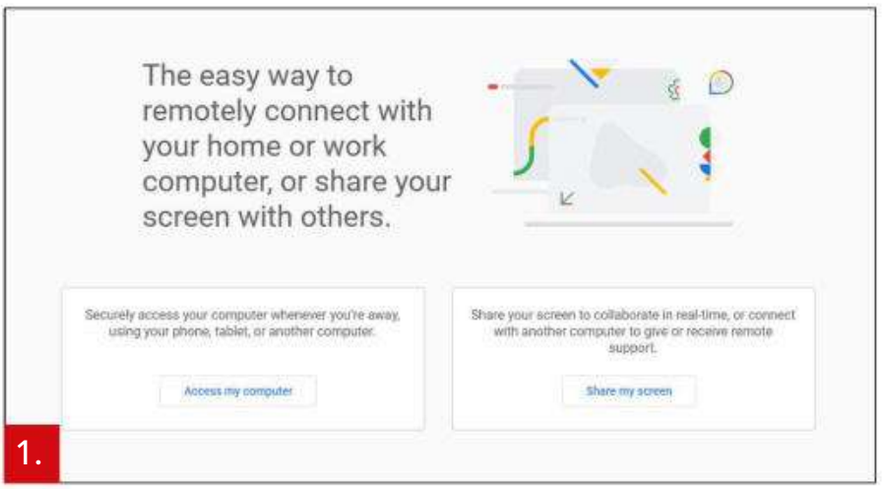
Credit: Getty Images/Poike

How to remote-access a Windows 10 PC

You don't have to use Windows' built-in option. ALAINA YEE reports

We've all had that text or phone call, asking for help with a Windows computer. And sometimes an in-person tech support visit isn't in the cards, making remote access to the PC the only viable option.

Problem is, in most cases you won't be able to use Remote Desktop (fave.co/2Wm3wMg), Windows' built-in option, for this purpose. The PC being connected to (aka the person needing assistance) has to have a Windows 10 Pro license, and the vast majority of people tend to have Windows 10 Home on their machine. You could shell out £100 for an upgrade on the fly to unlock the feature, but it's not necessary. Use one of these third-party services instead.


The easy way to remotely connect with your home or work computer, or share your screen with others.
Securely access your computer whenever you're away, using your phone, tablet, or another computer.
Access my computer
Share your screen to collaborate in real-time, or connect with another computer to give or receive remote support.
Share my screen
1.

to your Google account for access.

This solution actually works across different operating systems, so if they're on a Windows PC and you're on macOS or Linux (or heck, even a smartphone), you can still help them out.

Note: For all the software mentioned below, you'll need to install it both on your computer and that of the person you're helping.

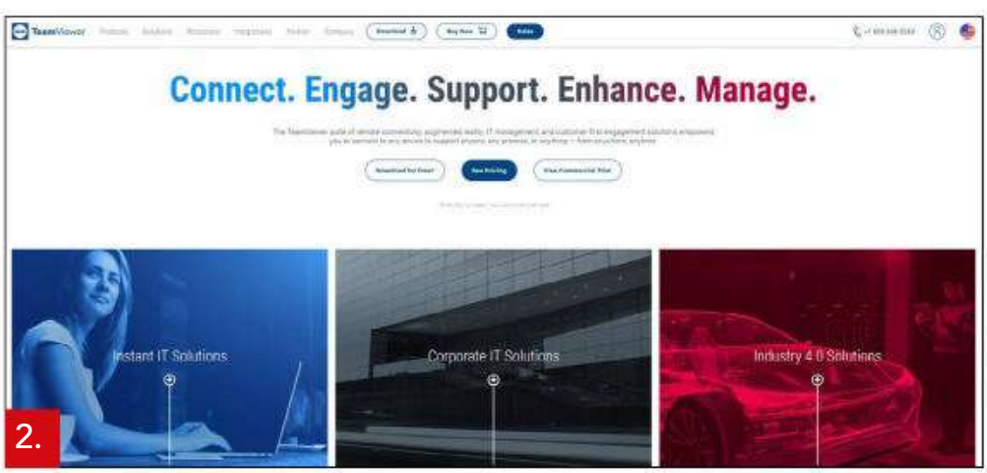
1. CHROME REMOTE DESKTOP

Google's solution for remote access is one of the most dead-simple options out there. (If you'd still like a guide, check out our sister publication Computerworld's walk-through of installation and set-up at fave.co/3B7YcLi.) And as an added benefit, the more technophobic will likely find it a less confusing or intimidating interface – most everyone uses Chrome as their default browser. Sessions are encrypted and also require sign-in

Price: Free
URL: fave.co/3kmFI30

2. TEAMVIEWER

One of the most popular options for remote desktop access is TeamViewer, which is free for personal use. With a modern, user-friendly interface, it makes the setup and connection process simple. (You can read up on how to establish a remote connection and much more in TeamViewer's own clear instructions at fave.co/3zkxgY8.) But



2.

because this program is designed for IT professionals, you get more features and granular control over settings.

The only drawback to TeamViewer stems from high-profile vulnerabilities that have come to light, most recently last summer. The company has addressed these issues and released patches immediately, but if you have high concerns around security, you may be more comfortable with an alternative solution.

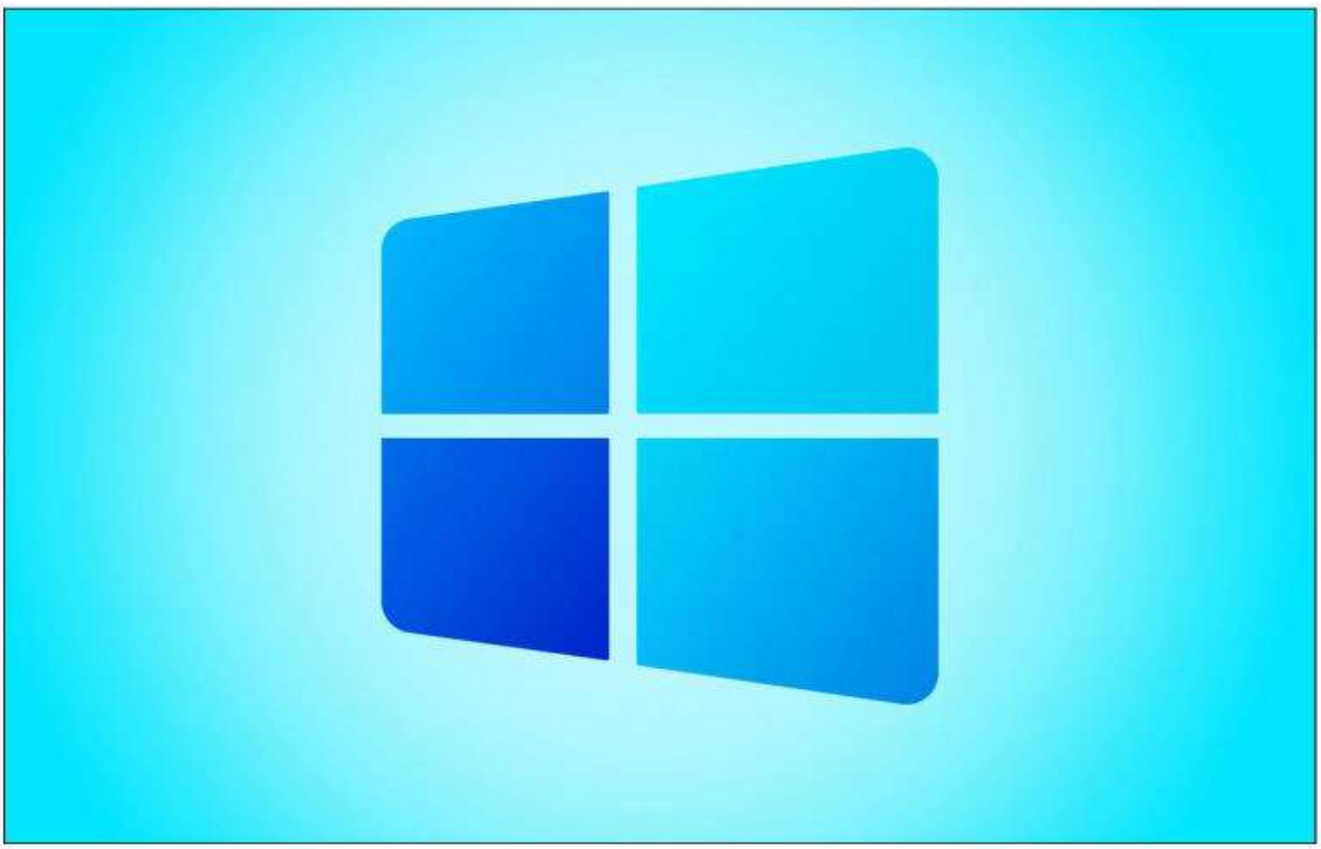
Price: Free
URL: fave.co/3zjhlJE

3. TIGHTVNC

Its website may look like an early 2000s relic, but you can't argue with TightVNC's reliability or its reputation. As open-source software, it's community supported and vetted. Adjusting settings in the program is also a transparent and fairly straightforward process, which is both its greatest strength and weakness. People with at least a passing familiarity with networking (or a willingness to Google on the fly) will likely have a more comfortable time when installing, configuring, and using the program.

But that greater control does elevate it as an option for those who want more say in how their remote access software functions—and without the blotch on its standing that TeamViewer has, due to its previous security issues. And if TightVNC doesn't quite suit you, there are other variants of VNC you can try, like UltraVNC (fave.co/3Bd0hFI).

Price: Free
URL: fave.co/3zbZjZT



How to pause Windows 10 updates

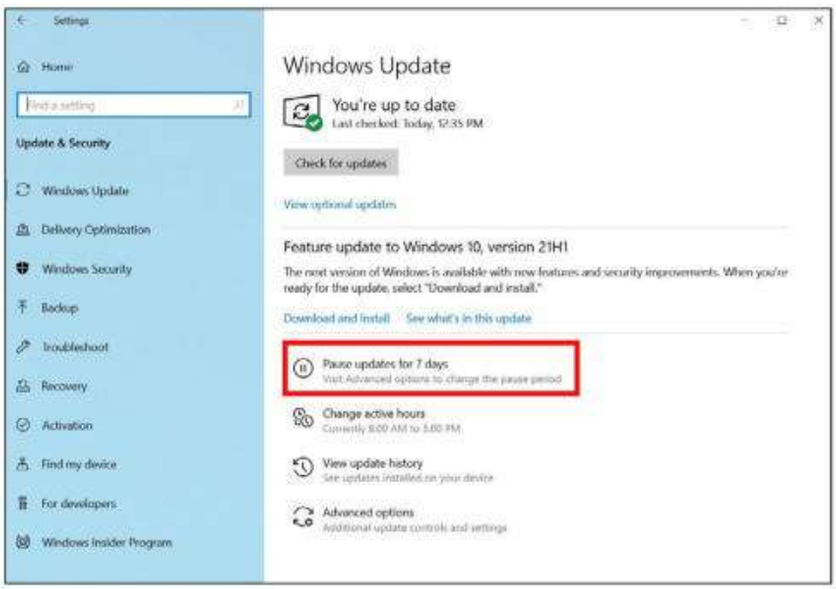
Sometimes you just can't deal with regular updates to your operating system. Here's how to take a break. IAN PAUL reports

Sometimes Windows updates can cause enough problems that you just want to turn the whole thing off. We're going to show you how to do that, but first remember this: In general, pausing Windows Updates is a bad idea. The reason is that you can miss out on critical security patches that keep your PC safe from malicious actors. At the time of this writing, for example, Windows users were asked to update to avoid getting hit with the 'PrintNightmare' vulnerability – see Tech Advisor October 2021.

Unfortunately the patch for 'PrintNightmare' caused some printers to

stop working. Microsoft then advised users to roll back the update as one way to get their printers working again. About a week later, Microsoft released an update that was a fix to the fix.

It's problems like that which inspire people to take a break from updates, but it's not the only reason. Sometimes you just can't deal with updates for an extended period because of work, travel, or vacation. The thing is you can't stop updates indefinitely. At most you can stop updates for 35 days, and by default Microsoft sets updates to pause for just seven days.

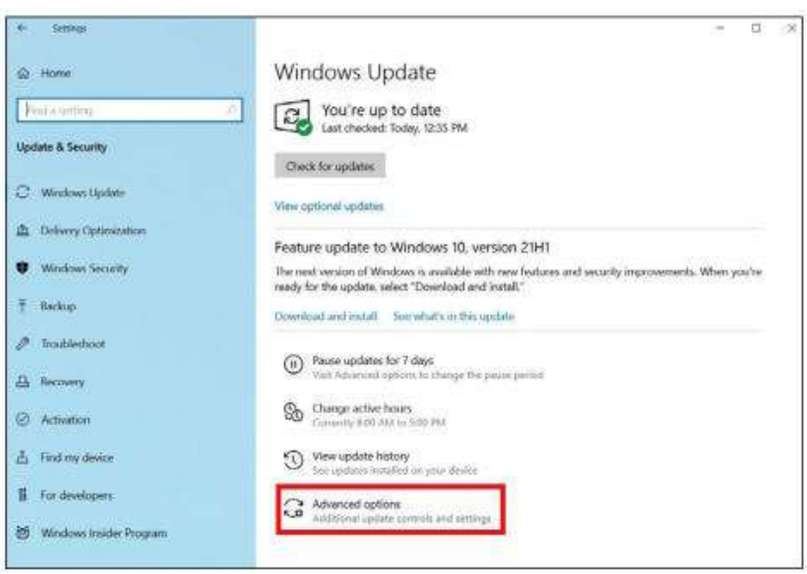


Start by selecting to pause Windows 10 updates in the Settings app.

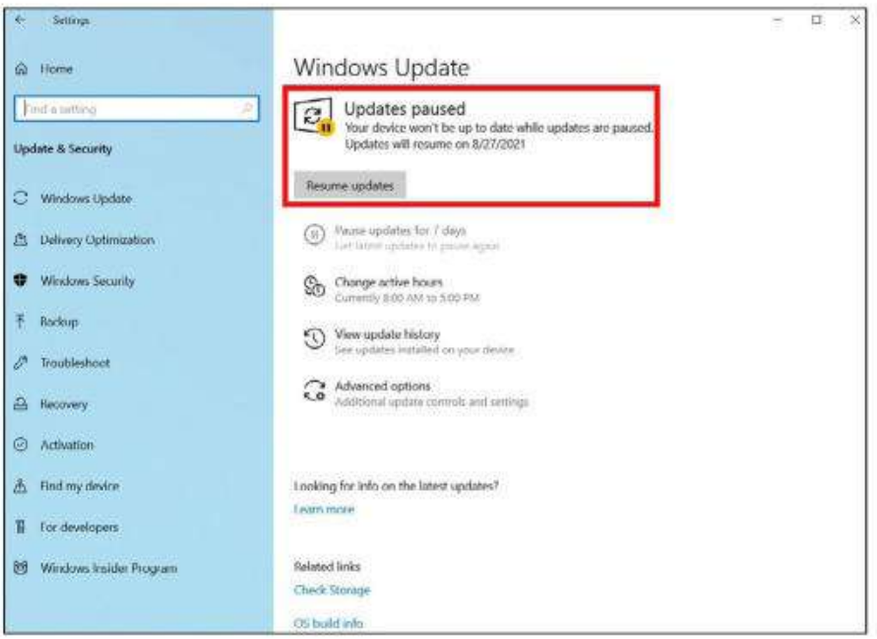
First, we'll show you how to pause updates for the default period. Then we'll show you how to extend paused updates for the amount of time you need up to the five-week maximum.

PAUSING UPDATES

To get started, open the Settings app by either going to the Start menu and selecting the cog icon on the left, or tapping the Windows Key + I shortcut. Inside the Settings app, go to Update & Security > Windows Update. At the top, right under the Check for updates button, you'll see a section that says Pause updates for seven days. Click that, and the updates will stop for the pre-set period.



Click on Advanced options to extend the updates pause.



Updates are now paused for 35 days.

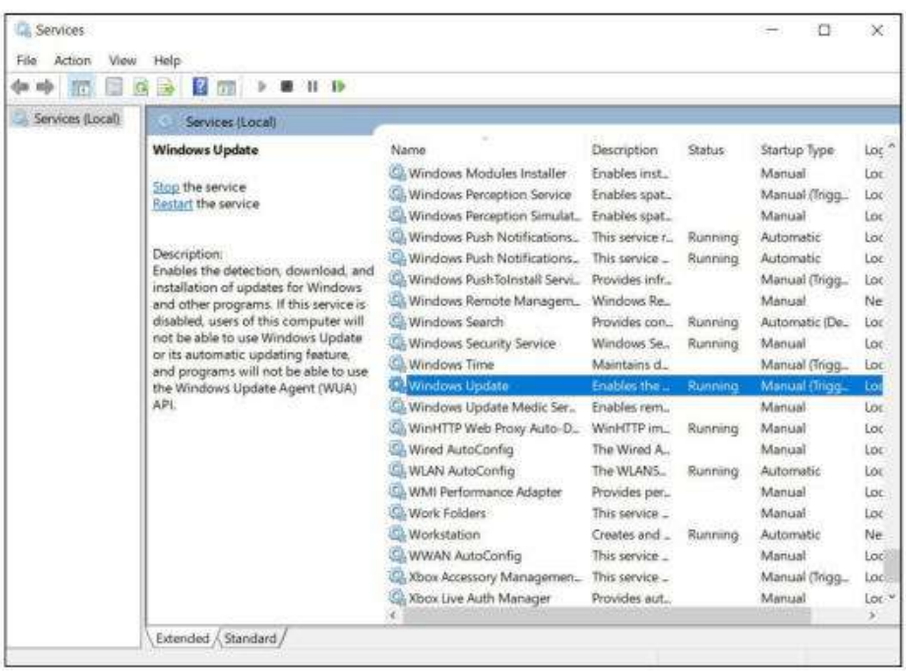
To extend that update for longer than the default, go down a little farther and click Advanced options. Then scroll down to the 'Pause updates' section and click the Select date drop-down menu.

This will show you a selection of dates based on today's date, as opposed to generic choices like eight days, 10 days, and so on. Choose whichever date is most appropriate for you, and that's it. Your new choice will be automatically set. You can check this by hitting the back button in the upper left corner and returning to the primary Windows Update screen.

During the pause period you will continue to get new Windows Defender definitions, but that's it. Once your update period runs out, you will have to download and install all the recommended updates you skipped before being able to pause updates again.

DISABLING UPDATES

There is another method you can use that is a little more involved, and it



The Services window in Windows 10.

will disable updates. Again, this is not permanent, and there's no real set time for how long this feature will work. It may revert on a reboot, for example. Hit Windows Key + R to open the Run utility. Then type in the entry box services.msc and hit Enter on your keyboard, or click OK.

This opens the Services window. Scroll down until you see the entry called Windows Update and double-click it. In the next window that opens, click the drop-down menu labelled 'Startup type' and select Disabled. Click Apply and OK, close the smaller window, then close the Services window, and you're done.

Remember, this will not disable Windows 10 updates indefinitely, and it can be reset over time after a reboot or other event.

Pausing updates isn't the best strategy for home users, but it's easy enough to set up for those times that you need it

Samsung Galaxy Book

Price: £899 (inc VAT) from fave.co/3jen2mA

After a five-year hiatus, Samsung returned to laptops with a bang in 2020. Alongside Qualcomm and Intel versions of the Galaxy Book S, we also saw a new convertible in the Galaxy Book Flex and regular clamshell Galaxy Book Ion.

The range has been significantly expanded in 2021, with the new Galaxy Book Pro and Flex 2. However, there's also evidence that Samsung is catering more to affordable price points than ever before.

The ARM-based Galaxy Book Go has been joined this year by an Intel-powered device known simply as the Samsung Galaxy Book. It offers a lot of what most people are looking for on paper, with the latest Intel chips, a full-size keyboard and a large display.

But how well does it stack up to real-world usage? Read on to find out.

DESIGN

When it comes to design, Samsung has played it fairly safe with the Galaxy

Book. Its curved edges and sleek aluminium finish have been seen on countless other laptops, including the company's own Flex 2. In fact, aside from the variation in sizing, it's hard to tell these two Samsung laptops apart from the outside.

The Galaxy Book's curved edges and sleek aluminium finish have been seen on countless other laptops.

It's very much a minimalist aesthetic, especially as there's no alternative to the 'Mystic Silver' colourway – a little odd considering Samsung normally likes a splash of colour on Galaxy products. If you want your laptop to stand out or be a conversation starter, you'll need to look elsewhere.

The Galaxy Book certainly has a more distinctive design once you flip open the lid, something that's possible with just one finger. The first thing you'll probably notice is the large 15.6in LCD display – more on how it performs later.

It's housed within some slim bezels, although there's still room for a 720p webcam. The quality of this sensor is in line with most you'll find built into modern laptops; it's fine for video calls, but streamers or YouTubers will need a separate accessory.

Unfortunately, it's not compatible with Windows Hello face unlock. Given the absence of a fingerprint sensor, it means you'll still have to type a PIN or password every time you unlock the device. I can't understand why Samsung didn't add support for at least one of these other than to save money.

It's not like there's no room on the keyboard, either. That large display means the Galaxy Book has space for both a full-size keyboard and a separate number pad. The keys themselves offer very little travel, but they're impressively tactile and responsive – I was satisfied with how they performed.

However, the same can't be said for the trackpad. Samsung has included a huge one the Galaxy Book, but it'd have been better off focusing on its performance. I found it to be very erratic and unreliable, with the cursor frequently

The large display means the Galaxy Book has space for both a full-size keyboard and a separate number pad.

moving around the screen at random or not registering my command.

This remained the case even after a software update mid-testing, so I think it's hardware related. I'd highly recommend connecting a Bluetooth mouse, but it limits the device's portability somewhat.

That's a shame because at 1.55kg it's one of the more lightweight 15in laptops you can buy. Samsung hasn't tried to make the Galaxy Book ultra-thin for the sake of it, though – at 15.4mm thick, there's plenty of room for ports.

The device makes the most of it, too, with a selection that you won't find on many modern laptops. I'm talking 2x USB-C (either of which can be used for charging), 2x USB-A, full-size HDMI and 3.5mm headphone jack.

There's even a lesser-spotted microSD card slot, so you probably won't need to carry an adapter around with you.

DISPLAY

Let's talk about that display, then. It's a 15.6in LCD panel, at a resolution of 1,920x1,080. Despite not being OLED, I was satisfied with its performance. Colours are rich and vibrant, offering an impressive level of detail for the price. While surfing the web, word processing and watching videos, I can have no complaints.

However, that's not reflected in the SpyderX display analysis I performed. That suggests it only hits 63 per cent of sRGB colour gamut, 47 per cent AdobeRGB and 46 per cent of DCI-P3. This isn't a big issue for everyday usage, but graphic designers or photo editors will want something much more accurate.

I recorded a maximum brightness of 325 nits using the same tool, so outdoor usage will be a struggle. Unlike the Flex 2 and other Samsung laptops, there's no option for the 'Outdoor+' brightness booster here.

Viewing angles are good though with Samsung's PLS technology, essentially

its own version of IPS. One feature I really miss here is touch support. Samsung will likely say it's not needed on a non-convertible device, but I wish it'd introduced both features instead. Considering the navigation problems mentioned above, a touchscreen would have been a useful alternative.

Like the lack of biometrics, it's a cost-cutting choice to keep the final price as low as possible.

On the audio side, it's a more impressive story. The Galaxy Book feature features dual 2W speakers, alongside Dolby Atmos support. These specs aren't revolutionary by any means, but both music and voices are warm and rich, picking out details you won't hear on some other laptops.

It's slightly lacking in bass and can distort at higher volumes, but audiophiles can easily connect external speakers or headphones.

PERFORMANCE

The Galaxy Book might be one of Samsung's more affordable laptops, but it hasn't made big sacrifices under the hood. Like so many 2021 computers, it's powered by Intel's latest Tiger Lake chips – the model I tested uses the Core i7-1165G7, but it's also available with the Core i5-1135G7.

Both use Iris Xe integrated graphics, and feature 8GB of RAM.

Judging from the sample I tested, performance is one of the Galaxy Book's key strengths. I noticed almost no slowdown across a variety of everyday tasks, including web browsing, word processing and some photo editing. The large display also makes it great for multitasking – using a web browser, Slack and a word processor at the same time is easily achieved.

The display offers an impressive level of detail for the price.

This great performance doesn't quite extend to graphically-demanding AAA gaming – a discrete GPU is recommended for that. But casual

games are well within reach. As you can see from the benchmarks below, the Galaxy Book compares favourably with many similarly-priced laptops. These figures will inevitably take a hit if you're using the i5 model, but everyday performance should still be solid.

Geekbench 5 (multi-core)

Samsung Galaxy Book: 5,320
Samsung Galaxy Book Flex 2: 4,657
Huawei MateBook 14 (2020): 6,614
HP Envy 13 (2020): 3,685
Microsoft Surface Laptop Go: 3,440
Lenovo Yoga Slim 7: 4,512

PCMark 10

Samsung Galaxy Book: 5,045
Samsung Galaxy Book Flex 2: 4,900
Huawei MateBook 14 (2020): 5,095
HP Envy 13 (2020): 4,156
Microsoft Surface Laptop Go: 3,392
Lenovo Yoga Slim 7: 4,120

Battery life

Samsung Galaxy Book: 7 hours, 24 minutes
Samsung Galaxy Book Flex 2: 19 hours, 44 minutes
Huawei MateBook 14 (2020): 10 hours, 5 minutes
HP Envy 13 (2020): 10 hours, 12 minutes
Microsoft Surface Laptop Go: 10 hours, 47 minutes
Lenovo Yoga Slim 7: 11 hours, 50 minutes

30-minute charge

Samsung Galaxy Book: 39%
Samsung Galaxy Book Flex 2: 42%
Huawei MateBook 14 (2020): 45%
HP Envy 13 (2020): 53%
Microsoft Surface Laptop Go: 37%
Lenovo Yoga Slim 7: 22%

The Galaxy Book has both Wi-Fi 6 and Bluetooth 5.1 on board, but there's also the option to add 4G LTE connectivity. That wasn't available on the model I tested, but it's a great solution for on-the-go productivity.

SOFTWARE

There's usually very little to talk about when it comes to the software on Windows laptops – it's usually the same regardless of which device you go for. While that's still the case, it's worth mentioning Windows 11 here. Microsoft's new OS is set to arrive in late 2021, which might make you uneasy about buying a new Windows 10 laptop.

However, there's no need to worry. The Samsung Galaxy Book meets all the new hardware requirements, so it'll be eligible for a free upgrade to Windows 11 Home at some point. You may have to wait until 2022, though.

The Galaxy Book will be eligible for a free upgrade to Windows 11 Home.

The version of Windows 10 you get right now is very familiar to anyone who's used a Windows PC recently. Unlike with its smartphones, Samsung has kept the software tweaks to a minimum. There are a handful of pre-installed apps, such as Samsung Notes and Gallery, but these can be uninstalled if you like.

You also get a relatively basic Samsung settings menu in addition to the regular one, which offers extra functionality you won't normally find on Windows 10. These include a range of different performance modes and the option to limit the maximum charge to 85 per cent, which is said to extend the lifespan of the built-in battery.

BATTERY LIFE

Talking of battery, the Galaxy Book's cell comes in at 69.7Wh. That's a solid capacity, so it's no surprise to see Samsung claim you can get up to 10.9 hours from a single charge.

Unfortunately, my experience with the device wasn't as impressive. Despite having the brightness set to a relatively dim 120 nits and looping a 720p video offline while muted, the Galaxy Book only lasted 7 hours and 24 minutes.

Many of the laptops we've tested recorded more than double that, so it's an underwhelming performance.

What's more, real-world usage depletes the battery significantly more quickly. Bumping up the brightness and having multiple open windows and apps means you'll struggle to make it through a full workday. Indeed, I found myself reaching for the charger by mid-afternoon. However, charging speeds are more in line with what you'll find elsewhere. Samsung advertises fast charging using the 65-watt adapter in the box, and I recorded a reasonable 39 per cent in 30 minutes from off.

VERDICT

Samsung has proven it can make great smartphones that don't break the

bank, but it still has work to do when it comes to laptops.

The regular Galaxy Book gets a lot of things right, with a premium build, excellent performance and decent display. Audio is also very impressive, and there's a decent port selection.

Unfortunately, Samsung has cut too many corners to get there. Battery life is underwhelming, trackpad navigation is very poor and there's no fingerprint scanner or face unlock. I also miss the touch support and convertible functionality you get on so many laptops these days.

If you can find the Galaxy Book with a significant discount, it's probably worth taking the plunge. Otherwise, it's hard to justify in the ultra-competitive world of modern laptops. Anyron Copeman

SPECIFICATIONS

- 15.6in (1,920x1,080) PLS LCD panel
- Windows 10 Home
- Intel Core i7-1165G7 processor
- Intel Iris Xe GPU
- 8GB RAM
- 512GB SSD
- 2x USB-C ports (1x Thunderbolt 4)
- 2x USB-A
- 1x HDMI
- 3.5mm headphone jack
- MicroSD card reader
- Wi-Fi 6
- Bluetooth 5.1
- 720p HD camera
- Dual 2-watt speakers
- Fingerprint sensor
- 69.7Wh battery with 65-watt USB-C fast charging
- 356.6x229.1x15.4mm
- 1.55kg

Acer Aspire 1 (A114-33)

Price: £299 (inc VAT) from fave.co/3kupwgi

The Acer Aspire 1 (A114-33) is a budget laptop that rarely misses a beat with low-intensity tasks, from email and word processing to streaming the latest box set and surfing the web. But can it compete in an increasingly overstuffed sub-£300 field?

With a price tag of £299, expectations should be realistically modest. At the same time, £50 less will get you the impressive Asus E410, while £50 more will stretch to the stylish Lenovo IdeaPad 3i 14. There's competition everywhere you look.

The Aspire 1 A114-33 is a new addition to the Aspire 1 series, lacking quite the same confusing array of spec options of the preceding Aspire 1 A114-32. At the time of writing, Acer UK is offering just a single model with a solitary list of low-end components through its website. Checkout choice paralysis has been avoided, which is a mercy at this price point.

We have seen a lower-specced model for £50 less available from some third-party sellers, but we'll be focusing on the main (top) model here.

DESIGN

One thing's for sure, the Acer Aspire 1 A114-33 is no lightweight. At 1.9kg, it's a relatively hefty piece of kit to lug around. It's pretty thick, too, at just a lick under 20mm. It is a very cheap laptop, after all.

Even before you attempt to pick the laptop up, however, it'll have made an impression one way or another. Coming only in a particularly soft shade of 'Peachy Pink', and with a metal-effect plastic casing, it certainly isn't low-key. You're either going to love it or hate it, though there are silver and blue options if you don't mind a lower grade processor.

Our review unit was 'Peachy Pink'.

There's a reasonable amount of flex to the body of the laptop, but it holds up well in the areas that count. Resting my palms on the bottom corners whilst typing didn't yield any great movement or creaking.

This being a cheap laptop, you'll find plenty of those tell-tale corner-cutting touches, such as a hinge that's too stiff for the weight of the bottom half, meaning you'll have to use both hands to open it up. Still, this serves a double purpose, and the overly stiff hinge ensures a rock-solid viewing experience with zero wobble.

The screen bezels are about as subtle as that shade of Peachy Pink, with a thick border and a particularly chunky chin. The shiny Acer logo almost gets lost in all that plastic, but again, this isn't unusual in such a cheap laptop.

Up top, there's no physical privacy shutter on the web like the Lenovo IdeaPad 3i. But at least this front-facing camera hits 720p resolution.

KEYBOARD

We're well past the point where a solid typing experience is unusual in a budget laptop, but props should still go to Acer for

Acer has replicated the standard chiclet experience.

coming up with the goods all the same. I researched and wrote this entire review on the Aspire 1, moving directly over from (and flitting in between) a 2019 MacBook Pro. Perhaps the best thing I can say about the experience is that it was a more or less friction-free transition – the usual Windows shortcut rewiring process aside.

The gravitational pull of modern keyboard design long ago shifted towards Apple, of course, but Acer has found a solid way of replicating the standard chiclet experience on a low budget, with appropriate spacing and key travel. There's a certain amount of wobble and sponginess to the keys, but I experienced no discernible false or missed presses.

Just about the only layout annoyance here relates to the close positioning of the Page Up and Page Down keys so close to the left and right arrow keys. I found them a little too easy to press by mistake, but your mileage may vary on that.

There's no backlighting facility here, though, so you'll have to type by the light of that 14in display in the absence of sun or lamplight.

The touchpad is fine for a cheap laptop, with on-point touch response. The buttons are slightly clunky, though, and this was where I experienced a few false presses. As is often the case with laptops of this price, you're probably better off adapting to the touch and gesture controls rather than relying on physical inputs.

DISPLAY

The Acer Aspire 1 (A114-33) offers a 14in IPS display with a Full HD resolution, which is really all you can ask for at this price, where low-grade TN panels are frequently an option and even at HD.

With the benefits of in-plane switching included, viewing angles are respectable. I didn't feel the need to

The Acer Aspire 1 has a 14in IPS display with a Full HD resolution.

endlessly fiddle with that stiff hinge, as is often the case for many cheap TN-packing laptops.

It yielded a more than respectable 310 nits maximum brightness in my testing, too, which means that it remains perfectly usable on half-brightness in regular daytime indoors conditions. You wouldn't want to take it outside on a sunny day, though this is a ComfyView display, which means it has an anti-glare matte surface to improve viewability in bright conditions.

Colour reproduction is solid, though notably lacking in pop compared to pricier laptops. It's fine for productivity tasks and the odd YouTube video, but a little too washed out to do full justice to movies and box sets.

Acer has included a set of stereo speakers, seemingly situated on the underside of the base. I struggled to discern any great separation between left and right channels, at least until I played a stereo sound test that exaggerated the split profile. Sound quality is clear enough, but incredibly thin and weedy, with plenty of treble but virtually no low end.

Suffice to say, if you're planning to consume any long-form music or video content, you'll want to make full use of the built-in Bluetooth 5.0, or else plug into the 3.5mm headphone jack situated on the right-hand edge.

PERFORMANCE

The single configuration of the Acer Aspire 1 A114-33 offered by Acer UK gives you a 1.1GHz quad-core Intel Pentium Silver N6000 CPU. I've also spotted a couple of cheaper variants, available from the likes of Amazon and AO, which pack a lesser dual-core Intel Celeron N4500 or N4020.

According to Intel, the top model's N6000 processor has gained 30 per cent performance over the Pentium

N5030 before it. But there's no denying it's a modest provision, especially with a limited 4GB of DDR4 SDRAM as a wingman.

In general usage, I found that the Aspire 1 is realistically capable of running one light task at a time. Hopping between multiple tasks tends to cause a fairly lengthy pause, and clicking on a dormant web tab will lead to another wait as the content loads back in. I'd have loved a little more memory to smooth things over, that's for sure, but such is the way with cheap laptops.

One other note of warning: you'll have to make do with a scant 64GB of flash memory, which can and does quickly fill up – especially with 6GB of that taken up by Reserved Storage out of the gate. It's a perfectly fine amount for a Chromebook, but not so hot in a Windows 10 machine - albeit one that comes with S Mode set as the default. This limits you to Microsoft's official App Store and a generally more locked down experience until you make the (free) one-way trip to full Windows 10.

In benchmark terms, the Aspire 1 falls just a little shy of the Intel Core i3-1005G1 Lenovo IdeaPad 3i in the CPU-focused Geekbench 5 multi-core stakes, but gets soundly trounced in PC Mark 10, which is more indicative of real-world usage. Check out how the Aspire 1 compares with similarly priced rivals in our benchmark tests below.

Geekbench 5 (multi-core)

Acer Aspire 1: 1,861
Lenovo IdeaPad 3i: 1,940
Asus E410: 2,101
Avita Liber V: 1,300

PCMark 10

Acer Aspire 1: 2,460
Lenovo IdeaPad 3i: 3,287
Asus E410: 3,301
Avita Liber V: 2,954

Battery life

Acer Aspire 1: 13 hours, 32 minutes
Asus E410: 13 hours, 51 minutes
Avita Liber V: 6 hours, 39 minutes

30-minute charge

Acer Aspire 1: 42%
Lenovo IdeaPad 3i: 26%
Asus E410: 33%

When it comes to connectivity, the Aspire 1 is pretty basic. You get three USB-A ports, two of which are USB 3.2, one of which is the slower USB 2.0. You also get an HDMI port for those external monitor moments, a Kensington lock slot, and a Gigabit Ethernet connection, but there's no modern USB-C facility or SD card slot.

The Acer Aspire 1 is strong all-round when it comes to battery performance.

BATTERY LIFE

The Acer Aspire 1 is strong all-round when it comes to battery performance. Acer claims you'll get eight hours from a single charge, which tallies closely with my experience.

During one morning's work I wrote a review in Word, loaded 50 pictures into storage using an SD card dongle, juggled multiple Chrome tabs, checked email semi-frequently, and watched around 40 minutes-worth of YouTube videos. All of this was with the screen brightness set to around two-thirds for comfortable viewing in a naturally lit home office. At the end of this four-hour period, the Aspire 1's battery had dropped from full to 55 per cent.

In our usual video loop test, the Aspire 1 lasted 13 hours 32 minutes, which is about 20 minutes shy of the aforementioned Lenovo IdeaPad 3i, and 44 minutes better than the Asus E410.

It's not too sluggish when it comes time to recharge, either. With 30 minutes of charging from the bundled 45W AC adaptor, the Aspire 1's 42Wh cell went from dead to 42 per cent, which is a pretty good job for a cheap laptop. The Asus E410, by comparison, could only manage 33 per cent, while the Lenovo IdeaPad 3i got to 26 per cent in the same test.

VERDICT

The Acer Aspire 1 A114-33 is a decent-value laptop that offers few surprises or stand-out features. But then, that's not really what most people are after for their £300.

Featuring a fine typing experience, a solid Full HD IPS display, and strong all-

day stamina, this is the ideal laptop for those who need a long-lasting laptop for lighter tasks without breaking the bank.

It's not the slinkiest laptop on the market, even within its modest price bracket. And that Peachy Pink shade certainly won't be for everyone and appears to be the only colour available for the top-spec SKU.

But if you spend most of your working day in Word, Excel, Chrome, Gdocs and Mail, and often find yourself away from a power point while you're completing such undemanding tasks, then the Aspire 1 A114-33 won't let you down. Jon Mundy

SPECIFICATIONS

- 14in (1,920x1,080) PLS LCD panel
- Windows 10 Home in S mode
- Intel Pentium Silver N6000 processor
- Intel Xe GPU
- 4GB 2,933MHz DDR4 RAM
- 64GB M.2 SSD
- HDMI port
- 2x USB 3.2 (Gen 1) Type-A
- USB 2.0 Type-A
- 3.5mm headphone jack
- Intel Wireless-AC 9462 Wi-Fi 5 (802.11ac)
- Bluetooth 5.0
- Webcam
- Dual speakers
- 42Wh 2-cell Li-ion battery
- 330x240x20mm
- 1.9kg

Xiaomi Mi 11 Ultra

Price: £1,199 from fave.co/3BSAEeK ★★★★☆

Ultra' is slowly becoming the mobile industry's preferred term for phones that are big, beautiful and have jam-packed spec lists up to and including the kitchen sink. The Mi 11 Ultra is no different.

In Xiaomi's case, although the Mi 11 Ultra packs a few advantages over the regular Mi 11 across the board, the brunt of the budget has clearly gone into the outrageous rear camera module, which despite including 'only' three lenses is in fact one of the most powerful camera set-ups around – so powerful that it earns its own special rear-facing display.

That camera is both a blessing and a curse for the Ultra. It's part of why the phone is such a powerhouse, but the blocky, heavy design makes it both an eyesore and a discomfort that only the specs-obsessed will be able to overlook.

DESIGN

Let's get right to it then. You can't talk about how the Mi 11 Ultra looks without talking about the camera, so let's start

there. Stretching across the width of the phone, and covering about a quarter of the whole rear of the body, this is perhaps the largest camera module in any smartphone yet.

It juts out too – about as much as half the depth of the phone itself again. Throw in the small display built into it (more on that later) and the result is that you cannot ignore it.

This is perhaps the largest camera module in any smartphone yet.

It's the sort of camera module that people will point at from across the bar, that your friends will ask about with a slightly concerned look in their eye. It feels one small step away from just screwing an SLR lens onto the back of the phone and calling it a day.

Unsurprisingly, it's also heavy. Despite having the same size display, the Mi 11 Ultra is around 40g heavier than the Mi 11, at 234g. Some of that might come down to the choice to use a ceramic coating on the rear, instead of glass, but the camera clearly plays its part. Xiaomi has at least balanced the weight impressively well, so it doesn't feel too top-heavy, but that doesn't help with how hefty it is overall.

The ceramic rear comes in either white or black, and curves at the sides to match the curved display, which does at

The ceramic rear curves at the sides to match the curved display.

least keep the large phone comfortable to hold, if you don't mind the weight. Like the Mi 11, the screen is also quad-curved, meaning there's a very slight curvature to the top and bottom of the screen – barely there, but just enough to make swiping up or down from the edges a touch more comfortable.

There's no headphone jack, with the USB-C charging socket the only port, but you do get stereo speakers to make up for it. There's also no dedicated fingerprint sensor, which is instead built into the display. In terms of protection, the display is encased in the highest grade of Gorilla Glass Victus, and there's also an IP68 water and dust-resistance rating, which should keep it safe even when submerged.

Beyond the out-there camera design, the rest of the Mi 11 Ultra is surprisingly restrained, almost pedestrian in design. It's simple, sleek, and undeniably premium thanks to the smooth ceramic finish. It's just a shame that the camera – powerful as it is – spoils the effect for me.

Some may like the way it brazenly boasts of the phone's photography prowess, and may relish having a phone that looks as powerful as it is. I find it ungainly and awkward, and it's honestly the only thing that stops me from really loving the Ultra.

DISPLAY

The camera bump is a large part of the sheer size of the Mi 11 Ultra, but the display has its part to play too – though in fact it is the exact same size as on the regular Mi 11 at 6.81in.

It's a similar display in other respects too, also offering a 120Hz refresh rate, AMOLED tech, and a high QHD+ resolution – though it's actually brighter, with 1,700 nits peak brightness, and boasts Dolby Vision support in addition to other HDR tech.

About the only display tech you'll find on rivals that isn't here is support for a dynamic refresh rate, capable of going slow as well as fast – but really that's a battery-saving measure, and

This is a beautiful display, and easily among the best out there.

The 1.1in rear display is designed for when the phone is facing screen-down.

from within the camera app, letting you use it to frame selfies taken with the main camera.

For the most part this display is a bit of a novelty, but the extra always-on display is welcome at least – and no doubt more power-efficient than using the larger main display for the same purpose.

doesn't make anything actually look better. The long and short of it is that this is a beautiful display, and easily among the best out there, so long as you don't mind the size (which, as I've already mentioned, as it least eased slightly by the quad-curvature).

Blacks are inky and deep, colours are vibrant, and the high refresh rate keeps the phone feeling smooth no matter what you're using it for.

There is, of course, the matter of the rear display. This 1.1in AMOLED is actually the same panel that Xiaomi uses in its Mi Band 5 fitness tracker.

Here, it's used primarily as an always-on display for when the phone is facing screen-down, with options to display a clock, image, or custom text, along with notification alerts. It can also be activated

PERFORMANCE

You'd be worried if a phone with 'Ultra' in the name didn't include top internal specs, but naturally the Mi 11 Ultra delivers the goods.

The flagship Snapdragon 888 chipset – only recently surpassed by the new 888+ – lies at the phone's heart, and Xiaomi has combined it with a choice of 8 or 12GB of RAM, and 256GB or 512GB of storage. That's more than enough on both counts, and even the lower tiers should be satisfactory to most.

Geekbench 5 (multi-core)

Xiaomi Mi 11 Ultra: 3,499
Xiaomi Mi 11: 3,684
Samsung Galaxy S21 Ultra (Exynos): 3,511
Oppo Find X3 Pro: 3,360

OnePlus 9 Pro: 3,611
Google Pixel 5: 1,625

GFX Manhattan 3.1

Xiaomi Mi 11 Ultra: 53fps
Xiaomi Mi 11: 54fps
Samsung Galaxy S21 Ultra (Exynos): 50fps
Oppo Find X3 Pro: 40fps
OnePlus 9 Pro: 36fps
Google Pixel 5: 20fps

In benchmarks, the phone doesn't throw out many surprises, falling around the middle of the range we've seen for Snapdragon 888 phones on the CPU-heavy Geekbench 5 test.

On the more graphics-focused GFXBench tests, it keeps pace with and at times surpasses other phones with comparable display specs.

It's a similar story day-to-day, where the phone can breeze through just about anything you throw at it, and multi-task with ease. Basically, if you want powerful, future-proofed, flagship phone performance, this has it in spades.

In terms of connectivity, there's 5G networking of course, along with Bluetooth 5.2 and Wi-Fi 6E. You also get NFC, and even an IR blaster.

PHOTOGRAPHY

The Mi 11 Ultra may excel almost everywhere, but ultimately it's a phone that's really about the camera. Luckily, it excels here too.

The main sensor is a showstopper. At 50Mp it's not the highest resolution camera out there, but the 1/1.12in sensor is one of the largest in a phone right now. That means it's capable of capturing more light and delivering richer colour, superior dynamic range, and improved lowlight photos.

The phone can breeze through just about anything you throw at it.

In good lighting, shots are bright and colourful, with minimal artifacting, noise, or signs of artificial sharpening. Shooting in daylight the only issue I ever really had was one shot where the HDR simply didn't fire at all, leaving the

sky completely over-exposed – while a similar shot taken moments later looked much better. I didn't notice this happen again though.

In dim light there's a little more noise, but still loads of detail and some of the most accurate colours I've seen from a phone at night. Night mode usually improves things further, adding detail and better exposing individual light sources, but be warned – if there's too much ambient light it will overwhelm the image, as in one of my night-time photos of Windsor Castle (see page 12).

A 48Mp wide-angle camera is next up, and results here are also excellent. The sensor is smaller than the main lens, and has a tighter aperture at f/2.2, but photos are roughly comparable in good light. They do pull apart in dimmer light, with much less detail in shadowy spots from this lens – probably in part because this is the only lens of the three that doesn't feature optical stabilization – but the resulting photos are still very impressive.

Finally, and arguably most excitingly, is the 5x periscopic zoom lens. Xiaomi touts this as '120x zoom', even writing as much on the camera module itself, but in fact you're getting 5x optical, 10x hybrid, and pure digital zoom for anything beyond, which mostly just means it's cropping in.

Our first test shot was taken using the main lens.

Here we have the same scene shot with the ultra-wide lens…

… using the 5x zoom…

… the 10x zoom…

… and finally the epic 120x zoom.

Here we have a couple of examples of images shot at night.

In this photo, you can see how too much ambient light can overwhelm an image.

Our final two test shots are a selfie…

… and a portrait photo.

At 5x and 10x shots are phenomenal out of this lens, and comfortably rival the main lenses on many other phones, even with the small f/4.1 aperture. Expect bright colours and bags of detail.

Beyond that results do drop off, and I must say I'm not too impressed with photos as it approaches the max digital zoom, which are mostly grainy smudges. This is one area where Xiaomi is clearly lagging behind Samsung – the Galaxy S21 Ultra's 10x periscopic lens handles these ultra-zoom shots much more comfortably, and that phone also offers the option of a 3x zoom lens to sit in the middle of the range.

Selfies can be handled one of two ways. The front-facing camera is a very solid 20Mp, f/2.2 affair that delivers excellent results across the board. It will, however, be out-classed by the rear cameras, so you also have the option of activating that dinky rear-facing screen to frame yourself for shots with any of the rear cameras – although, unless your arms are a few times longer than mine, you'll struggle to get much benefit from the periscope lens here.

Video chops are naturally impressive too. The main lens can shoot video at up to 8K at 24fps, or 4K at 60fps, and benefits from OIS – while the selfie camera is limited to 1080p at 60fps with only electronic stabilization. This is another small loss relative to Samsung, as the S21 Ultra can shoot 4K selfie video.

You might think that the rear display would let you shoot 8K selfie video with this phone, of course, but at the time of writing video isn't supported here – and nor are Portrait and Night mode, or anything beyond standard photos really. Xiaomi will reportedly add this functionality in via an update, but it's not there just yet.

BATTERY LIFE

If there's a perk to buying a phone the size of the Mi 11 Ultra, it's that there's plenty of space to fit in a big battery.

Xiaomi has delivered on that front, with a 5000mAh cell in here – certainly not the largest battery around, but fairly generous really. It's needed to drive the phone's powerful specs and large display though, so even with that battery you shouldn't expect much more than a day to a day-and-a-half of battery life.

Battery life

Xiaomi Mi 11 Ultra: 9 hours, 51 minutes
Xiaomi Mi 11: 9 hours
Oppo Find X3 Pro: 10 hours, 20 minutes
Google Pixel 5: 12 hours, 34 minutes

Fast charge (30 minutes)

Xiaomi Mi 11 Ultra: 88%
Xiaomi Mi 11: 79%

Samsung Galaxy S21 Ultra (Exynos): 56%
Oppo Find X3 Pro: 96%
OnePlus 9 Pro: 96%
Google Pixel 5: 45%

Charging speed is at least more of a slam dunk. The phone supports 67-watt charging on both wired and wireless.

Let's take wired first. In Europe Xiaomi includes a 67-watt charger in the box, although in India it ships with a slower 55-watt charger. Testing with the 67W charger, I managed to top the phone up to 52 per cent in 15 minutes, and 88 per cent in half an hour – among the fastest speeds you'll find in a phone right now.

The wireless charging is arguably even more impressive, but with one big caveat: you'll need Xiaomi's proprietary 67-watt wireless charger, which isn't included with the phone anywhere. That means I haven't been able to test it at max speed myself, but Xiaomi says it will charge to full in 49 minutes. I can at least confirm that it will happily charge at slower speeds on standard Qi chargers.

SOFTWARE

Xiaomi ships the Mi 11 Ultra running MIUI 12 on top of Google's Android 11 operating system, although it can already be upgraded to the newer MIUI 12.5.

It's likely to receive the update to Android 12 later this year, but frustratingly Xiaomi still doesn't promise any specific number of Android updates beyond that. An upgrade to Android 13 next year is likely, but not guaranteed – another knock compared to promises from Samsung and some other rivals for three years of Android version updates.

MIUI is far from my favourite Android skin, but it has improved compared to previous versions. I find it needlessly obtuse and difficult to navigate, especially when it comes to delving through the Settings menu, but for those willing to put in the work it does offer impressive flexibility and customization.

I would still always prefer a Samsung, Oppo, or OnePlus phone for their software – or of course one of Google's

The Mi 11 Ultra runs MIUI 12 on top of Android 11.

Pixel devices – but even if you've never used MIUI before it's mostly just a matter of getting used to its quirks.

VERDICT

The Mi 11 Ultra packs some of the absolute best hardware out there, from top internal specs to a powerful camera, beautiful display, and fast charging using both wired and wireless methods.

There are downsides, though. The sheer price is an obvious one, as is the slightly clunky MIUI software and lack of an update promise, but honestly the design is a bigger flaw. The Mi 11 Ultra is not only big, but thanks to the ungainly camera module it is also ugly.

Unless you really want the novel miniature rear display you can get similar performance in a much more attractive package in the Galaxy S21 Ultra, which also nets you slightly superior zoom photos and smoother software – albeit with slower charging. It's mostly the existence of that phone that makes the Mi 11 Ultra a difficult sell for the average user – but then again, this certainly isn't an average phone. Dominic Preston

SPECIFICATIONS

- 6.81in (3,200x1,400; 515ppi) AMOLED display
- Android 11, MIUI 12.5
- Qualcomm SM8350 Snapdragon 888 5G (5nm) processor
- Octa-core (1x 2.84GHz Kryo 680, 3x 2.42GHz Kryo 680, 4x 1.8GHz Kryo 680) CPU
- Adreno 660 GPU
- 8GB/12GB RAM
- 256GB/512GB storage
- Three rear-facing cameras: 50Mp, f/2.0, 24mm (wide), 1/1.12in, 1.4µm, Dual Pixel PDAF, Laser AF, OIS; 48Mp, f/4.1, 120mm (periscope telephoto), 1/2.0in, 0.8µm, PDAF, OIS, 5x optical zoom; 48Mp, f/2.2, 12mm, 128-degree (ultra-wide), 1/2.0in, 0.8µm, PDAF
- Selfie camera: 20Mp, f/2.2, 27mm (wide), 1/3.4in, 0.8µm
- Wi-Fi 802.11 a/b/g/n/ac/6e, dual-band, Wi-Fi Direct, DLNA, hotspot
- Bluetooth 5.2, A2DP, LE, aptX HD
- GPS with dual-band A-GPS, GLONASS, GALILEO, QZSS, NavIC, BDS (tri-band)
- NFC
- USB Type-C 2.0, USB On-The-Go
- Fingerprint scanner (under display, optical)
- Non-removable 5,000mAh lithium-polymer battery
- Fast charging 76 watts
- 164.3x74.6x8.4mm
- 234g

Nubia Red Magic 6R

Price: £429 from fave.co/2UJTP9U ★★★★☆

The rapid rise of gaming phones has coincided with the emergence of Nubia's Red Magic line as a real force. After 2017's Razer Phone proved there was a market for dedicated gaming handsets, the first Red Magic phone arrived in April 2018.

It's gone on to maintain an aggressive six-month update cycle, but 2021 is proving to be Red Magic's biggest year yet. The Red Magic 6 series saw a regular and Pro model for the first time, even if the latter is still exclusive to China. The brand's first wearable arrived in the form of the Red Magic Watch, but it's the other phone that launched alongside it that's the focus here. The Red Magic 6R is a new, affordable alternative to the 6 and 6 Pro that doesn't sacrifice on high-end specs. But can it compete with the wealth of capable mid-range handsets currently available? Let's find out.

DESIGN

With the Red Magic 6R, it's clear Nubia is trying to appeal to more mainstream

design tastes. It's significantly scaled back the typical gamer aesthetic in favour of clean lines and a minimalist look and feel.

That's reflected in the colour options, with the 'Cosmos' model I tested joined by a single 'Mercury' alternative. It's the first Red Magic phone I could see normal people taking an interest in, rather than being put off. However, die-hard mobile gamers might miss the wacky designs we've come to associate with the Red Magic range.

Still, there are some subtle signs of the 6R's gaming prowess on the back of the phone. It features a two-tone design and some unique patterning, both of which are likely to resonate with gamers.

Of course, one thing you can't ignore here is the rear camera module. It features four lenses and large flash, but protrudes significantly from the back of the phone. That makes it rock annoyingly when you use it on a table, but that's not a big issue for most people. More on the cameras later.

Flipping the Red Magic 6R over reveals a large touchscreen display, housed within impressively slim bezels. This gives the phone an impressive 87.5 per cent screen-to-body ratio, primarily due to a hole-punch selfie camera, something you won't find on the regular Red Magic 6 and 6 Pro.

The lack of symmetry may irk gamers (because most games are played in landscape), but it makes much more sense during everyday use. That 16Mp camera works well for face unlock, but it's not as secure as Face ID or other 3D-scanning systems.

The rear of the phones has a two-tone design and some unique patterning, which will resonate with gamers.

I'd recommend using the optical in-display fingerprint scanner - it's the most impressive implementation of the technology I've tried so far. Unlike some other phones, it was both extremely fast and reliable – the only time it stopped unlocking was when my finger was wet.

The large touchscreen display, housed within impressively slim bezels.

There's Gorilla Glass 3 front and back, while the frame is made from aluminium. Nubia has kept things very simple on the sides of the device, with just a power button, volume rocker and two shoulder triggers. That means there's no dedicated slider for the 'Game Space' mode, although the mode is available.

Unfortunately, Nubia has downgraded the cooling system on the Red Magic 6R. The built-in fan you'll find on the 6 and 6 Pro isn't here, so the device can quickly get hot to the touch during intense gaming. It's not a huge issue, but definitely noticeable compared to recent Red Magic phones.

The bottom of the phone is where you'll find the single SIM tray (no microSD support, sadly), USB-C for charging and single downward-firing speaker. The latter provides impressively punchy audio for something so small, but lacks a bit in detail.

However, it's also worth highlighting the Red Magic 6R's weight. It clocks in at 186g – that's fairly typical for a modern smartphone, but significantly lighter than the 220g Red Magic 6 and 6 Pro.

We recommend using the optical in-display fingerprint scanner.

DISPLAY

Let's talk about the main event – the Red Magic 6R's 6.67in AMOLED display. It's slightly smaller than the 6.8in panel you'll find on the Red Magic 6, although both share the same 2,400x1,080 resolution. That's plenty detailed for most people, especially when you consider the high refresh rate.

The Red Magic 6R's display delivers great colours and impressive dynamic range.

The Red Magic 6R can hit 144Hz – that's up there with some of the best smartphones, beaten only by the Red Magic 6's class-leading 165Hz. From testing that phone, I can assure you that the extra 21Hz makes very little difference. Even if it did, few games on the Google Play Store are compatible with these high refresh rates.

In everyday use, the Red Magic 6R's display ticks all the boxes for most people. It deliver great colours and impressive dynamic range. I also recorded a maximum brightness of 370 nits, and visibility was good in all but the harshest lighting conditions.

PERFORMANCE

Despite its mid-range price point, the Red Magic 6R undoubtedly features top-of-the-line specs. It shares many of these with the more expensive Red Magic 6, including Qualcomm's flagship Snapdragon 888 chipset. This is includes a capable Adreno 660 GPU and 8GB of RAM on the model I tested, although there are also options for 6GB or 12GB of the latter.

Combined with that 144Hz refresh rate and a 400Hz touch sampling rate, performance from the Red Magic 6R is stellar. It zips through web browsing, emails, messages, videos and multitasking with relative ease, but high-end gaming is where the phone really excels.

Many games don't support those higher refresh rates, but they all provide

an immersive experience that you'll struggle to beat on a smartphone. That's especially true while playing demanding titles such as Call of Duty: Mobile and Asphalt 9, which some similarly priced handsets can struggle with.

The former is where the shoulder triggers on the right side of the device come into their own. As the name suggests, they can be used to shoot opponents (or trigger other functions) rapidly, freeing up your thumbs for other things. Combined with the high refresh rate, this could potentially give you a crucial upper hand during fierce combat or racing games.

This superb performance is reflected in the below benchmarks:

Geekbench 5 (multi-core)

Red Magic 6R: 3,426
Red Magic 6: 3,705
Asus ROG Phone 5: 3,725
ZTE Axon 30 Ultra: 3,663
Samsung Galaxy S21 Ultra: 3,511
Apple iPhone 12 Pro Max: 4,241

GFX Manhattan 3.1

Red Magic 6R: 107fps
Red Magic 6: 87fps
Asus ROG Phone 5: 94fps
ZTE Axon 30 Ultra: 94fps
Samsung Galaxy S21 Ultra: 50fps
Apple iPhone 12 Pro Max: 59fps (metal)

It's also worth noting that the inclusion of the Snapdragon 888 chip means the Red Magic 6R supports 5G. The technology becoming more widespread these days, but I only had a 4G SIM during testing so can't comment on its effectiveness.

SOFTWARE

The Red Magic 6R runs the custom Red Magic OS over Android 11, with no word on a potential update to Android 12 once it comes out. Now in its fourth generation, Nubia's skin is a big departure from so-called 'stock' Android, with fewer rounded corners and no app drawer.

There's also plenty of bloatware. Nubia has its own versions of the calendar, clock, photo gallery, dialler and many more – none of which can be uninstalled. There are no duplications here, but I expect most people would prefer Google's versions.

Other notable changes in Red Magic OS 4.0 include a new-look notifications shade and redesigned Settings menu, but you do still get the Google Discover cards to the left of the home screen.

There might not be a dedicated button for it, but Nubia's Game Space mode is still here. It works in the same way as on other Red Magic phones, boosting performance and limiting

distractions for a more immersive experience. Instead of flicking the slider on the side of the phone, you're instead prompted to launch Game Space when starting up a relevant game.

One of the great things about Android is its range of customization options, but they're relatively limited here. The big disappointment is that you're limited to the default launcher – there's no way to change it without jailbreaking. And this is unnecessarily restrictive.

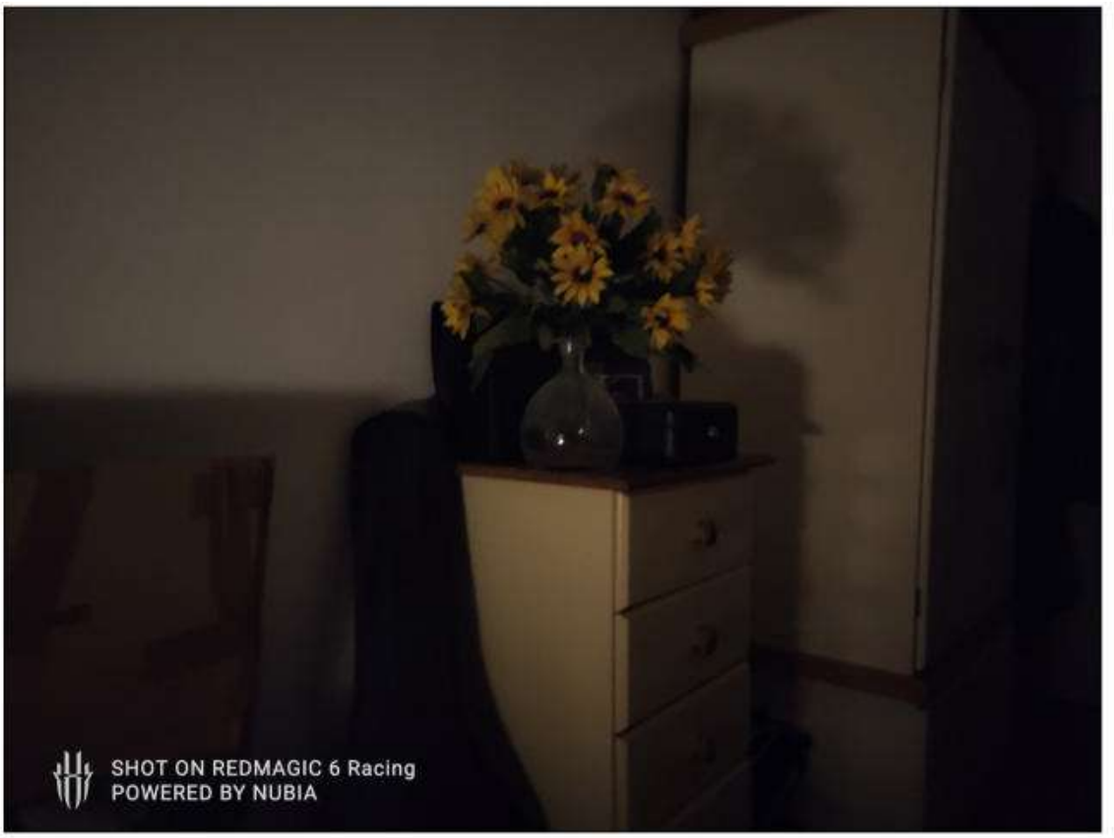
PHOTOGRAPHY

If Nubia is trying to appeal more to everyday consumers with the Red Magic 6R, cameras take on greater importance. The device has the same 64Mp wide and 8Mp ultra-wide sensor as the regular 6, but bumps the macro up to 5Mp and adds a new 2Mp depth sensor.

Unfortunately, the results you get aren't a noticeable improvement over what we've seen from Red Magic phones in the past. Stills aren't bad by any means, but they do fall short of what we know smartphone cameras are capable of.

The 6R has a tendency to produce shots which either look washed out or have too much contrast – there's very little middle ground. That does mean some photos are pleasing to the eye,

We'll start off our test photos with an example of a close-up shot.



Our next two images have night mode off…

… and night mode on.

Our next series of photos were taken using the main lens…

… the 3x zoom…

… the 5x zoom…

… and the 10x zoom.

Finally, we have examples of a selfie…

… and a portrait photo.

but they're not very true to life. It also makes the camera quite unreliable, as you can't trust it to consistently produce the same quality.

You can tweak this via the camera's 'Pro' mode, but the 6R doesn't have a great point-and-shoot camera.

That being said, there is still a lot to like here. The wide-angle lens offers some great flexibility, while the dedicated night mode produced impressive shots in low light. An upgraded 16Mp front-facing camera also delivers great detail in selfies, even if beauty mode is enabled by default.

On the video side, the Red Magic 6R is capable of up to 8K footage at 30fps, but most people will be happy sticking with 1080p at 60fps. The inclusion of electronic image stabilization (EIS) at all resolutions except 8K means footage remains smooth while moving around.

BATTERY LIFE

Battery life is another area where Nubia has made compromises. The Red Magic 6R has a 4,200mAh cell, down from 5,050mAh on the 6 and 6 Pro. Despite a slightly smaller display, it's a significant step down.

I recorded a solid 9 hours and 20 minutes in Geekbench 4's screen-on test, but that's with brightness set to 120 nits – much dimmer than most people will use. It's also significantly less than the 13 hours and 57 minutes the Red Magic 6 managed.

Nonetheless, PC Mark 10's Work 3.0 battery benchmark (at 200 nits brightness) simulates everyday tasks during the test. A score of 8 hours and 12 minutes suggests a full day's usage is well within reach.

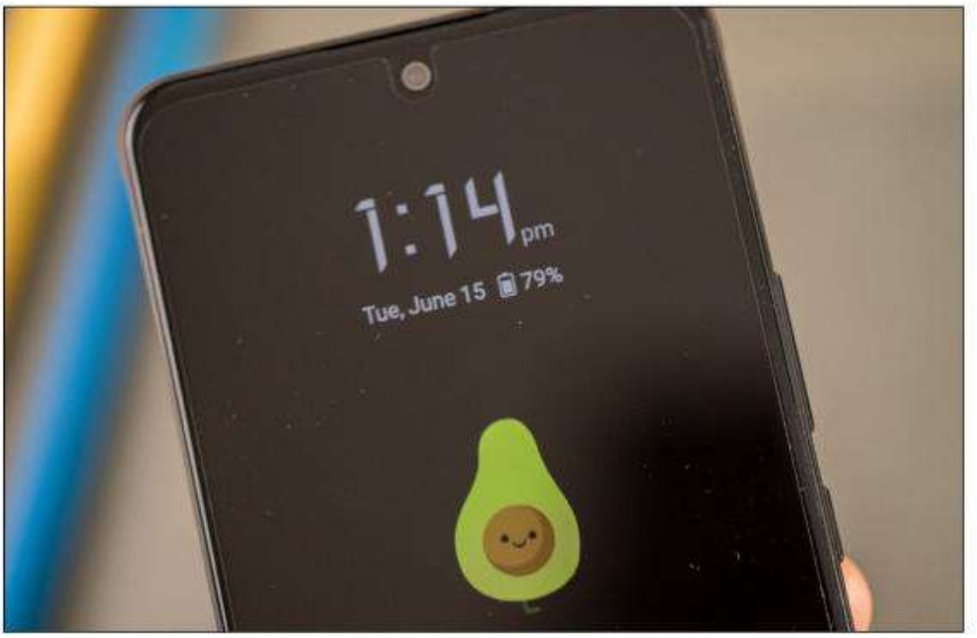
Battery life

Red Magic 6R: 9 hours, 20 minutes
Red Magic 6: 13 hours, 57 minutes
Asus ROG Phone 5: 13 hours, 54 minutes
Samsung Galaxy S21 Ultra: 11 hours, 4 minutes
Apple iPhone 12 Pro Max: 9 hours, 8 minutes

Fast charge (30 minutes)

Red Magic 6R: 60%
Red Magic 6: 71%
Asus ROG Phone 5: 74%
ZTE Axon 30 Ultra: 52%
Samsung Galaxy S21 Ultra: 56%
Apple iPhone 12 Pro Max: 14%

That's consistent with my experience, although I had to drop the refresh rate down to 90Hz to make sure. This provides a good balance between smooth visuals and battery life, but means you don't take advantage of what the phone is capable of.



The Red Magic 6R provides a good balance between smooth visuals and battery life.

There's some regional variation when it comes to charging speeds. The Chinese variant of the Red Magic 6R can handle 66 watts, but you're limited to 30 watts on the global version, the one I tested. The adapter is at least included in the box, and it charged the phone up to 60 per cent in just 30 minutes.

VERDICT

Despite ditching the gamer aesthetic and built-in fan, the Red Magic 6R is arguably Nubia's most ambitious gaming phone so far. That's primarily due to its affordable mid-range price point, and the fact it doesn't compromise on high-end specs. You're still getting the top-of-the-line, 5G-enabled Snapdragon 888 chipset, alongside powerful integrated graphics and generous helpings of RAM and storage. Performance is superb, as you might expect.

That's significantly helped by a large 144Hz AMOLED display. It's a slight step down from the Red Magic 6's class-leading 165Hz, but it's still best of the rest when it comes to smartphones, and very few games support the higher rate.

But, the 6R is far from perfect. The cameras and software are still more frustrating than fun to use, while a reduced battery capacity means you'll be reaching for the charger sooner when using the highest refresh rate.

Nonetheless, there's still plenty to like here. If you're looking for a top-tier gaming phone without the traditional design or price tag, the Red Magic 6R is a great option. Anyron Copeman

SPECIFICATIONS

- 6.67in (2,400x1,080; 395ppi) AMOLED display

- Android 11, Redmagic 4.0
- Qualcomm SM8350 Snapdragon 888 5G (5nm) processor
- Octa-core (1x 2.84GHz Kryo 680, 3x 2.42GHz Kryo 680, 4x 1.8GHz Kryo 680) CPU
- Adreno 660 GPU
- 6GB/8GB/12GB RAM
- 128GB/256GB storage
- Four rear-facing cameras: 64Mp, f/1.8, 26mm (wide), 1/1.73in, 0.8µm, PDAF; 8Mp, f/2.0, 120-degree, 13mm (ultra-wide), 1/4.0in, 1.12µm; 5Mp, f/2.4, (macro); 2Mp, f/2.4, (depth)
- Selfie camera: 16Mp, (wide)
- Wi-Fi 802.11 a/b/g/n/ac/6, dual-band, Wi-Fi Direct, hotspot
- Bluetooth 5.2, A2DP, aptX, LE
- GPS with dual-band A-GPS, GLONASS, BDS)
- NFC
- USB Type-C 3.0, USB On-The-Go; accessory connector
- Fingerprint scanner (under display, optical)
- Non-removable 4,200mAh lithium-polymer battery
- Fast charging 30 watts
- 163x75.3x7.8mm
- 186g

Google unveils Pixel 6 and 6 Pro smartphones

While the phones haven't yet launched, Google has officially confirmed the Pixel 6 and 6 Pro are coming. CHRIS MARTIN reports

The excellent Pixel 5 is Google's current flagship phone, but time stands still for no device, so we take a look forward at what to expect when its successors – the Pixel 6 and 6 Pro – arrive. In this article, we'll explore the expected release date, price and the new specs suggested to appear on Google's next flagship phones.

RELEASE DATE

Google officially announced the Pixel 6 and 6 Pro in a press release published in August – see fave.co/3grDv53. While it

didn't make mention of a specific release date, it repeatedly promised an autumn arrival, in line with past Pixel releases.

PRICE

Pricing is a bit less reliable when looking at past releases. Back in 2018, the Pixel 3 cost £739, but when the Pixel 4 came along, its price was £669. The cost of ownership dropped even lower with the Pixel 5, which, at the time of writing, you can buy for £599.

Sadly, we don't see this descending trend continuing, with the company's hardware executive, Rick Osterloh telling German site Der Spiegel, that the next Pixels "will be expensive".

While Osterloh didn't throw out any specific figures at the time, he did allude to the fact that recent Pixels haven't readily intended to compete with the top-tier devices pushed out by rivals.

As for the Pixel 6 Pro, we imagine it will be at least £100 more than the Pixel 6.

DESIGN

While Google's August announcement didn't reveal everything the Pixel 6 line would be bringing to the table, it did confirm a number of previously-leaked details, covering both the phones' design and hardware (as well as putting to bed the debate over whether the larger phone's name would be the 'Pixel 6 XL' or 'Pixel 6 Pro').

The company calls the jutting camera arrangement across each phone's back a "camera bar" and it's reportedly needed to accommodate the 'upgraded' rear camera system. Google says it features "improved sensors and lenses" that are "too big to fit into a traditional square".

Google didn't get into specifics, but it did state that both phones "have new materials and finishes, too – like the Pro's light polished aluminum [sic] frame, and the 6's matte aluminum [sic] finish".

These Pixels also appear to be reverting back to glass-backed designs, similar to the first three generations of

Google calls the black bar on the phone's rear a "camera bar".

Pixel; with contrasting colours on either side of that distinctive camera bar.

Speaking of colours, Google's characteristically quirky names for the colourways shown above haven't yet been published, however, tipster TechScoreNY has put forward 'Sorta Orange', 'Arctic Blue' and 'Mostly Grey'. These names were originally in reference to the 6 Pro specifically, however, assuming the images Google has since supplied are the only finishes for each model of phone, it's thought that 'Arctic Blue' might relate to the blue/green finish seen on the standard Pixel 6 depicted on the previous page.

While Google's initial round of official images does include shots featuring a centrally-positioned front-facing hole-punch camera, it looks like the Pixel 4a/4a 5G/5/5a's reinstated rear fingerprint scanner has gone, this time replaced with an in-display alternative.

SPECIFICATIONS

Google hasn't yet handed out a complete spec sheet for these freshly-teased phones, but here's what we know so far.

Google Pixel 6

- 6.4in (2,340x1,080; 403ppi) AMOLED, 90Hz, HDR10+ display
- Android 12
- Google Tensor (5nm) processor
- Octa-core CPU
- 12GB RAM
- 128GB/256GB/512GB storage
- Two rear-facing cameras: 50Mp, (wide), PDAF, OIS; 12Mp, (ultra-wide)
- Selfie camera: 12Mp
- Wi-Fi 802.11 a/b/g/n/ac/6, dual-band, Wi-Fi Direct, hotspot
- Bluetooth 5.2, A2DP, LE, aptX HD
- GPS with A-GPS, GLONASS, GALILEO, QZSS, BDS
- NFC
- USB Type-C 3.1
- Fingerprint scanner (under display, optical)
- Non-removable battery
- Fast charging
- 160.4x75.1x8.2mm

Google Pixel 6 Pro

- 6.71in (3,120x1,440; 512ppi) AMOLED, 120Hz, HDR10+ display
- Android 12
- Google Tensor (5nm) processor
- Octa-core CPU
- 12GB RAM
- 128GB/256GB/512GB storage
- Three rear-facing cameras: 50Mp, (wide), PDAF, OIS; 48Mp, (telephoto), PDAF, OIS, 4x optical zoom; 12Mp, (ultra-wide)
- Selfie camera: 12Mp
- Wi-Fi 802.11 a/b/g/n/ac/6, dual-band,

Wi-Fi Direct, hotspot
- Bluetooth 5.2, A2DP, LE, aptX HD
- GPS with A-GPS, GLONASS, GALILEO, QZSS, BDS
- NFC
- USB Type-C 3.1
- Fingerprint scanner (under display, optical)
- Non-removable lithium-polymer 5,000mAh battery
- Fast charging
- 163.9x75.8x8.9mm

PROCESSOR: TENSOR SOC

Google has revealed some of what we can expect from the custom silicon, destined for its flagship phones; sporting what it calls "Tensor" – a name we've already seen affiliated with a number of other Google projects, in relation to AI computing and machine learning.

The new Pixel 6 line-up will be the first to feature Google's Tensor chip.

An official statement states: "Tensor enables us (Google) to make the Google phones we've always envisioned – phones that keep getting better while tapping the most powerful parts of Google, all in a highly personalized [sic] experience. And with Tensor's new security core and Titan M2, Pixel 6 will have the most layers of hardware security in any phone."

While that doesn't shed a huge amount of light on just how exactly Tensor pulls away from the Snapdragon chips the company was previously sticking into Pixel devices, leaks leading up to this announcement referencing the chip's code name 'Whitechapel' add a little extra illumination.

GS101 'Whitechapel' (GS likely meaning 'Google Silicon') supposedly shares in Samsung's latest Exynos chip design and architecture, along with some of its software components.

It's supposedly made on a 5nm process (matching the 888 and Exynos 2100) and – as subsequently reiterated by

Google – focuses on AI and machine learning tasks, which means users can expect improvements in areas such as photography.

One thing we can predict is that the Pixel 6 will come with an Ultra-Wideband (UWB) chip and – combined with NFC – will support the new Digital Car Key feature in Android 12, allowing you to unlock a compatible vehicle with your phone.

POWER AND CHARGING

It seems the US and Japan-only Pixel 5a will be the last of the company's phones to ship with a charger, meaning the Pixel 6/6 Pro won't come with an adapter. Google's argument is in favour of reduced environmental impact, but it's hard not to ignore the cost benefits such a change also brings to the company.

At the same time, it's been reported that Pixel 6 test devices have been spotted plugged into 33-watt fast chargers, which if refilling Google's next smartphones at full pace will render the Pixel 6 line the fastest-charging phones in Pixel history, with devices previously topping out at 18 watts.

It also seems Google is working on a new wireless charging stand for the Pixel 6, that will include a cooling fan. There's no word on power output, but the fan will help keep the phone cool while it charges and looks like it will slow down if you wake the Google Assistant, presumably so the microphones can hear you better.

Designated 'Luxuryliner', it will be a follow-up to the £69 Pixel Stand'.

4 takeaways from Google's Pixel 6 preview

Google's Pixel 6 unveiling gives us plenty to look at, but the most important messages are under the surface. JR RAPHAEL reports

Well, it looks like the brightly coloured cat is out of the metaphorical bag. The feline in question is none other than two Pixel 6 phones. Google pulled off its new trick and let the air out of the rapidly leaking balloon by announcing its Pixel 6 and 6 Pro months ahead of their actual debuts.

And these new models are pretty different from Pixels past, too. As had been widely expected, they're the first Google-made phones to feature a Google-made processor – a distinction we've been talking about for quite a while and one that could go a long way in separating the phones from the rest of the Android pack.

We've already taken a look at the new phones design and specs (page 86). Here, I want to focus on four under-

emphasized effects of the Pixel 6 preview – a combination of between-the-lines suggestions and off-hand remarks that are getting less attention than the shiny outer shells and homemade innards.

1. THE SOFTWARE SUPPORT SHAKE-UP

This first Pixel takeaway is one I haven't seen come up at all, directly, as part of the current Pixel 6 blitz – but it's arguably the most important effect of Google's shift to a self-made processor.

By having its own custom chip inside the Pixel, Google will be able to support these phones with software updates for far longer than what's currently possible on Android.

While Google hasn't announced anything official about it yet, signs suggest the Pixel 6 and 6 Pro could come with a full five years of Android operating system updates. That's a huge step up from the platform's current three-year max, to say the least – and it could have some pretty significant implications, as we'll explore further in a moment.

2. THE 'ANDROID PIXEL' FACTOR

A hefty chunk of Google's Pixel 6 marketing materials focus on the way the phones showcase the new Material You theming system at the centre of Android 12. It's much more than a fresh coat of paint: Material You is a complete reimagining of the Android experience – think Android on some super-mellow mood enhancers. And it revolves around an ambitious new feature that taps into your own personal wallpaper to create a custom system-wide palette that then stretches across the entire Android experience – everything from your Quick Settings panel and settings screens to icons on your home screen and even the interfaces within apps.

Eventually, the implications will stretch even further than just your phone,

Material You is a complete reimagining of the Android experience

too: Google says your custom design choices on Android will at some point travel with your account across every app and type of device you use – applying to Google apps on the web as well as to Chromebooks, Smart Displays and Wear-based wearables. This is a Google ecosystem move, in other words. And the Pixel, it seems, could be the sole smartphone product to tie into that new cross-platform thread in its full and unadulterated form.

That, suffice it to say, is a monumental shift both for what the Pixel represents within Android and what Android itself represents as an operating system.

3. THE PIVOT BACK FROM THE PREVIOUS PIVOT

Last year, Google threw us a curveball with its Pixel product plan. After four years of establishing the Pixel as a premium, flagship phone, the tech giant came out with the Pixel 5 – which completely redefined what the brand stood for and what it was all about.

The Pixel 5 wasn't a top-of-the-line, top-dollar phone, nor was it meant to be. It was positioned as a more affordable phone that focused on the qualities that mattered the most but cut out many of the fancier niceties in order to hit a lower price. It was a move back toward the old Nexus model from Google's past, in a sense – where you could get a good, solid Android phone with exceptional software and without some of the higher-end bells and whistles for a surprisingly decent price.

As part of that, the Pixel 5 lacked the more premium metal or glass constructions its predecessors possessed, and it eliminated the just-launched (and heavily promoted) face unlocking technology the Pixel 4 had introduced a mere year earlier. It seemed to make sense from a sales perspective, as we pointed out at the time, since Google hadn't managed to make its high-end Pixels take off but had seen lots of success with its more economical Pixel 'a'-line phones.

Oh, yes: Google has pivoted back from its previous pivot and returned to the high-end, premium flagship approach for the Pixel, just one year after ever-so-briefly redefining the brand. It's one hell of a dizzying spin, even by Google's vertigo-inducing standards.

To be fair, we don't know exactly how much the Pixel 6 and Pixel 6 Pro will cost at this point. But in an interview with The Verge, Google hardware head honcho Rick Osterloh said they'd be in a "different" tier from the company's recent offerings and that the Pixel 6 would "certainly be a premium-priced product." As the author of that article

notes, it's tough to take that as meaning anything less than a thousand pounds.

The one saving grace, if Google manages to emphasize it effectively, could be that longer support life we talked about earlier. Think about it: if we arbitrarily say that one of the Pixel 6 models costs £1,200 but also assume that it'll get that full five years of software support we're expecting, that effectively means it'd cost £240 per year over the course of its advisable life. The similarly priced Samsung Galaxy S21 Ultra, in comparison, gets just three years of operating system updates – which makes it £400 per year of advisable ownership.

Only time will tell, of course, if Google finds a way to convey that advantage. Speaking of which...

4. THE MARKETING MACHINE

We're six years in now to Google's Pixel phone plan, and as of yet, the Pixel is still mostly a niche-level product for Android enthusiasts and other people 'in the know'. It's anything but a mainstream phone, and pretty much every set of market share stats reflects that.

Despite all of the Pixel's practical advantages over other Android phone options, its not-so-prominent positioning within the smartphone ecosystem isn't entirely surprising. Plain and simple, six years in, Google still seems to be doing barely anything – or barely anything effective, at least – to market the Pixel and make average phone-buying organisms aware of its most exceptional elements. And with every passing year and every new Pixel-exclusive element that gets added into the picture, that disconnect gets more discouraging.

Well, with the Pixel 6, Google says it's ready to start selling. "The product is really, now, The Google Phone," Osterloh told The Verge, "so we are ready to invest a lot in marketing and we want to grow."

Funny, because Google's been talking about the Pixel being "The Google Phone" since pretty much the first model. And it's been talking about moving the Pixel line beyond niche status and into mainstream position as a "next few years"-style goal for quite a few years now.

But maybe this time, it's serious. Maybe this time, it's ready to start pushing the Pixel properly. Maybe. We've certainly heard that story before, though, more than a couple of times.

Samsung just can't quit foldable phones: Meet the Galaxy Z Fold3 and Z Flip3

Samsung keeps iterating on its foldable phone line-up with better raw specs, S Pen support, and increased durability. JON PHILLIPS reports

Samsung has a fever and more foldable phones are the only prescription. And thus today the biggest name in Android phones announced the third generation of its foldable Galaxy smartphones: the Galaxy Z Fold3, a flagship model that opens like a book, and the smaller Z Flip3, a

less expensive model that opens vertically and harkens back to the flip phones of the early 2000s.

Both phones include new features to improve durability, which may help mitigate public perception that foldable phones just can't withstand the rigours of, well... repeated, incessant folding. And you're going to want a sturdier phone, given Samsung's price tags: £1,599/£1,699 for the Galaxy Z Fold3 and £949 for the Galaxy Z Flip3.

Shown here in its Cream option, the Z Flip3 comes with a 1.9in cover screen.

GALAXY Z FOLD3 5G: FEATURES

The Z Fold3 comes with S Pen support, and with its expansive 7.6in, 2,208x1,768 main display, it directly targets the Galaxy Note audience, which won't be getting a new model this year and may now be looking for a new productivity experience. The phone's Dynamic AMOLED cover screen (which you use when the Z Fold3 is folded up) is a no-excuses 6.2 inches with 2,268x832 resolution and 120Hz refresh rate for ultra-fluid screen response.

Anyone looking to buy the expensive Z Fold3 must have both deep pockets and big pockets, as this big boy is 6.2 inches tall and 0.6 inches thick when folded. As a point of comparison, the iPhone 12 Pro Max is about a quarter-inch thick.

Both the Fold3 and Flip3 promise a new level of durability thanks to IPX8 water resistance; a new Armor Aluminium construction ("the strongest aluminium ever used on a Galaxy smartphone"); and Gorilla Glass Victus, Corning's strong phone glass ever. The phones also come with a new protective film made of stretchable PET, and Samsung promises the new folding screens are 80 percent more durable than what came in previous folding-phone generations.

Even with the Z Fold3 folded up like a traditional phone, you'll have access to

three rear cameras: an Ultra Wide (12Mp, 123-degree field of view); a Wide Angle (12Mp with 83-degree field of view, dual-pixel autofocus, and optical image stabilization); and a Telephoto (12Mp with a 45-degree field of view and dual optical image stabilization). At the front of the folded phone is a 10Mp camera with an 80-degree field of view.

When in its unfolded, tablet-like state, you'll also get a 4Mp camera with an 80-degree field of view for video calls. The reason for the lower resolution is because the camera is Samsung's first to fit under the display. While it's a neat effect that creates an unobstructed view when using the tablet, you'll still see the camera peeking through from under the screen in some lighting.

5G is standard on both models, and the Z Fold3 has 12GB of RAM and either 256GB or 512GB of storage. Samsung is being vague on the two phones' processors, but you can rightly assume it's using the Qualcomm Snapdragon 888.

Specifications

- 7.6in (2,208x1,768; 374ppi) Foldable Dynamic AMOLED 2X, 120Hz, HDR10+ display; Cover display, 6.2in (,268x832), 25:9 ratio Dynamic AMOLED 2X, 120Hz, Corning Gorilla Glass Victus display
- Android 11, One UI 3.1.1
- Qualcomm SM8350 Snapdragon 888 5G (5nm) processor
- Octa-core (1x2.84 GHz Kryo 680, 3x 2.42GHz Kryo 680, 4x 1.8GHz Kryo 680) CPU
- Adreno 660 GPU
- 12GB RAM
- 256GB/512GB storage
- Three rear-facing cameras: 12Mp, f/1.8, 26mm (wide), 1/1.76in, 1.8µm, Dual Pixel PDAF, OIS; 12Mp, f/2.4, 52mm (telephoto), 1/3.6in, 1.0µm, PDAF,

The Z Fold3 offers a tablet-like experience, thanks to a 7.6in, 2,208x1,768, 120Hz display.

OIS, 2x optical zoom; 12Mp, f/2.2, 123-degree, 12mm (ultra-wide), 1.12µm
- Selfie camera: 4Mp f/1.8, 2.0µm, under display; Cover camera, 10Mp, f/2.2, 26mm (wide), 1/3in, 1.22µm
- Wi-Fi 802.11 a/b/g/n/ac/6e, dual-band, Wi-Fi Direct, hotspot
- Bluetooth 5.2, A2DP, LE, aptX HD
- GPS with A-GPS, GLONASS, GALILEO, BDS
- NFC
- USB Type-C 3.2
- Fingerprint scanner (side mounted)
- Non-removable lithium-polymer 4,400mAh battery
- Fast charging 25 watts
- Unfolded: 158.2x128.1x6.4mm; Folded: 158.2x67.1x14.4-16mm
- 271g

Unfolded, the Galaxy Z Flip3 has a 6.7in display.

GALAXY Z FLIP3 5G: FEATURES

The smaller Z Flip3 may be the more intriguing proposition, as the modernized flip-phone design offers generous screen real estate and should fit reasonably well in today's ridiculously undersized jeans pockets. Folded up, it's a porky three-quarters-of-an-inch thick, but only 3.4 inches tall. Your pocket will protrude a lot, but you'll actually be able to sit down.

The whimsical Z Flip3 comes in Cream, Green, Lavender, Pink and White, and features a 1.9in Super AMOLED cover display that's four times larger than the previous Galaxy Flip generation. You can use the tiny display to view notifications, texts messages, and various widgets designed for the small form factor. The main screen is 6.7in with a 2,640x1,080 resolution. Not too shabby for a phone that's smaller than an Altoids box when folded up.

The Z Flip3 has a more sober array of cameras. The front selfie cam is 10Mp with an 80-degree field of view. On the back, there's a 12Mp Ultra Wide with a 123-degree field of view and a 12Mp Wide-Angle with a 78-degree field of

view, dual-pixel autofocus, and optical image stabilization.

Specifications

- 6.7in (2,640x1,080; 426ppi) Foldable Dynamic AMOLED 2X, 120Hz, HDR10+display; Cover display, Super AMOLED, 1.9in (512x260)
- Android 11, One UI 3.1.1
- Qualcomm SM8350 Snapdragon 888 5G (5nm) processor
- Octa-core (1x2.84 GHz Kryo 680, 3x 2.42GHz Kryo 680, 4x 1.8GHz Kryo 680) CPU
- Adreno 660 GPU
- 8GB RAM
- 128GN/256GB storage
- Two rear-facing cameras: 12Mp, , f/1.8, 27mm (wide), 1/2.55in, 1.4µm, Dual Pixel PDAF, OIS; 12Mp, f/2.2, 123-degree (ultra-wide), 1.12µm
- Selfie camera: f/2.4, 26mm (wide), 1.22µm
- Wi-Fi 802.11 a/b/g/n/ac/6, dual-band, Wi-Fi Direct, hotspot
- Bluetooth 5.1, A2DP, LE
- GPS with A-GPS, GLONASS, GALILEO, BDS
- NFC
- USB Type-C 3.2, USB On-The-Go
- Fingerprint scanner (side mounted)
- Non-removable lithium-polymer 3,300mAh battery
- Fast charging 15 watts
- Unfolded: 166x72.2x6.9mm; Folded: 86.4x72.2x15.9-17.1mm
- 183g

Samsung unveils Galaxy Watch 4

The Galaxy Watch 4 is finally here. Here's everything you need to know. ALEX WALKER-TODD reports

Launching alongside the Galaxy Z Fold3, Flip3 (page 93) and Buds 2 (page 103), the Samsung Galaxy Watch 4 Series offers up what looks like more choice than ever before, with two variants, each in two sizes and all available with optional LTE connectivity.

The Galaxy Watch 4 and Watch 4 Classic serves up two distinct design styles while all delivering on performance (by way of a new Samsung-made mobile chipset) and user experience, by debuting the latest iteration of Wear OS, which the company has co-developed with Google.

RELEASE DATE

It's available to buy now.

PRICE

Samsung's Unpacked line-up arrived with markedly more affordable opening asking prices than their respective predecessors, with the smallest Watch 4 variant kicking things off at £249 and the Classic starting at £349. Here's key pricing across the whole range:

Galaxy Watch 4 (40mm)

Bluetooth only: £249
4G: £289

Galaxy Watch 4 (44mm)

Bluetooth only: £269
4G: £309

Galaxy Watch 4 Classic (42mm)

Bluetooth only: £349
4G: £2389

Galaxy Watch 4 Classic (46mm)

Bluetooth only: £369
4G: £409

FEATURES

The standard Galaxy Watch 4 features a contemporary design, with brushed aluminium lugs that extend to encapsulate the black polished metal body of the watch, while the Classic sports more conventional timepiece styling (similar to the Galaxy Watch 3), with a stainless steel body and – most prominently – a physical rotating bezel for interaction.

Depending on whether you opt for the smaller or larger-bodied version of either Watch 4, you can expect a 1.19in or 1.36in circular AMOLED display that sports a pixel density of 330ppi.

The BioActive Sensor branding that relates to the overarching fitness hardware inside the Watch 4 now extends to the two physical buttons on the watch's right side. While the top button serves as a home key and the bottom a back key, soft-pressing both after tapping 'Measure' on the new Body

The BioActive Sensor relates to the fitness hardware inside the Watch 4.

Composition app lets the Watch 4 get a read on things like your body's water retention, bone density and BMI.

Samsung says blood oxygen reading can now take place passively, while the Watch 4 tracks your sleep and functionality like the ECG – first seen on the Watch Active 2 – which took time to reach approval in various markets around the world, should be available to users from the get-go (in markets where previous Galaxy Watches had already received approval – Samsung suggests this includes nearly 40 regions).

The Watch 4 Series also serves as the debut for Samsung's newest wearable-centric chip, the 5nm Exynos W920.

Back in mid-May at Google I/O 2021, Google officially revealed that it was teaming up with Samsung to fuse Wear OS and Tizen OS into a single platform, which Samsung then confirmed would be powering its next Galaxy Watches; pulling in additional wellness and fitness features supplied by the now Google-owned Fitbit.

Following the Watch 4's announcement, the Korean company was quick to highlight that Wear OS as it appears on the Watch 4 Series is 'Wear OS Powered by Samsung', which doesn't reflect the experience as it might appear on forthcoming wearables from other manufacturers that choose to adopt this latest Wear OS release.

Samsung's take, which it calls One UI Watch, embraces much of what made Tizen (which ran on its previous Galaxy Watches) so approachable; like interaction by rotation (using the physical bezel on the Classic or the digital haptic alternative on the standard Watch 4), while Wear OS means the Google Play Store and experiences like Google Maps and Google Pay can now be accessed and can leverage the Watch 4's hardware.

Speaking of hardware, the Watch 4 Series also serves as the debut for Samsung's newest wearable-centric chip,

the 5nm Exynos W920, which is expected to be a huge leap forward compared to the best Qualcomm currently has to offer – the Snapdragon Wear 4100+, with its 12nm process and even the 10nm chip at play inside the Galaxy Watch 3.

According to Samsung, this latest silicon promises "1.25x faster processing times compared to the Exynos 9110" and "8.8x smoother graphics performance". 1.5GB of RAM and double the storage (16GB up from 8GB on the Watch 4's predecessor) also features, while longevity should be greatly improved too, with Samsung quoting 40 hours of wear per charge across the Watch 4 line.

SPECIFICATIONS

- 40mm Watch 4, 42mm Watch 4 Classic, 1.19in circular 396x396 Super AMOLED always-on display; 44mm Watch 4, 46mm Watch 4 Classic; 1.36in circular 450x450 Super AMOLED always-on display (
- Gorilla Glass DX+
- 1.18GHz dual-core Samsung Exynos W920 5nm processor
- 1.5GB RAM
- 16GB ROM
- Wear OS Powered by Samsung (operating system)
- One UI Watch (user experience)
- Bluetooth 5.0
- NFC
- GPS
- Wi-Fi
- 4G LTE via eSIM (optional)
- Accelerometer
- Barometer
- Gyro sensor
- Geomagnetic sensor
- Light sensor
- Compass
- Microphone
- Speaker
- Haptic motor
- Samsung Knox security
- Samsung BioActive Sensor:
- Optical heart rate sensor (PPG)
- Electrical heart sensor (ECG)
- Bioelectrical impedance analysis sensor (BIA)
- Heart rate tracking
- Blood oxygen tracking
- AFib irregular heartbeat detection
- Sleep tracking
- Snore detection
- Body composition analysis
- Guided workouts
- Bixby Voice support
- Gesture controls
- Aluminium casing (Watch 4)
- Stainless steel casing (Watch 4 Classic)
- 5ATM swim-proof
- IP68-certified dust and water-resistance
- MIL-STD-810G tested
- Wireless charging (supports Qi

charging)

- 40mm Watch 4, 42mm Watch 4 Classic, 247mAh battery; 44mm Watch 4, 46mm Watch 4 Classic, 361mAh battery
- Up to 40 hours battery life
- 30 minutes charge = 10 hours use
- 40mm Watch 4, 40.4x9.3x9.8mm; 44mm Watch 4, 44.4x43.3x9.8mm; 42mm Watch 4 Classic, 41.5x41.5x11.2mm; 46mm Watch 4 Classic, 45.5x45.5x11mm;
- 40mm Watch 4, 25.9g; 44mm Watch 4, 30.3g; 42mm Watch 4 Classic, 46.5g; 46mm Watch 4 Classic, 52g
- 40mm Watch 4, black, pink gold, silver; 44mm Watch 4, black, green, silver; 42mm & 46mm Watch 4 Classic, black, silver
- Compatible with Android 6.0 or higher (devices require more than 1.5GB RAM)

Galaxy Buds 2 announced

The Galaxy Buds 2 have active noise cancelling, wireless charging, ear detection, and more. CHRIS MARTIN reports

Possibly one of the most leaked Unpacked events ever revealed numerous new devices including the Galaxy Buds 2 wireless earbuds. Apart from a rumoured yellow colour, the vast majority of leaks turned out to be true, so we have a new standard pair of true wireless earbuds. This time around they have active noise cancelling and other premium features yet remain at an affordable price.

RELEASE DATE

The Buds 2 are available to buy now.

PRICE

£139.

SPECIFICATIONS

Although active noise cancelling was a little bit up in the air during the lead up to Unpacked, the Buds 2 offer it. Samsung says its system can cut out

up to 98 per cent of background noise. Furthermore, they have an Ambient sound mode with three levels of volume, so you can choose how much of the sound around you you want to hear.

Active noise cancelling is made possible by having three mics on each bud, with two on the outside. These are also used for calls, and Samsung says its machine learning method can detect unwanted sounds such as car horns, building sites or wind, and remove them using a Voice Pickup Unit. There are also touch controls, wear detection and the accompanying app can help you find the right fit with its Earbud fit test. The Galaxy Wearable app is also available on Windows PCs, so you can control things easily from your computer.

In terms of connectivity there's Bluetooth 5.2 and the Buds 2 will use Samsung's propriety codec when connected to a Galaxy smartphone or tablet for a 'stronger signal strength and better audio quality'.

Sound is handled by a 'dynamic two-way speaker' meaning there is a dual-driver set-up with a separate woofer and tweeter in each earbud for 'clear, high notes and deep atmospheric lows'.

The Buds 2 only have basic IPX2 splash resistance, but the charging case has both USB-C and Qi wireless charging. Samsung says the earbuds can last for up to five hours on a single charge with active noise cancelling turned on and a further 15 in the case.

The Buds 2 are available in Graphite, White, Lavender and Olive.

Here's an overview of the Galaxy Buds 2 specifications:

- Dynamic dual-drivers (woofer & tweeter)
- Bluetooth 5.2
- 3 mics per bud
- ANC with Ambient sound mode
- Accelerometer, Gyro, Proximity, Hall, Touch sensors
- 61mAh (bud), 472mAh (case)
- 5 hours buds, 15 hours case (ANC on)
- USB-C & Qi wireless charging
- IPX2
- 17x20.9x21.1mm, 5g (buds)
- 50x50.2x27.8mm, 41.2g (case)

INSIDE: COMPLETE GUIDE TO ANDROID 12

TECH ADVISOR

OCTOBER 2021

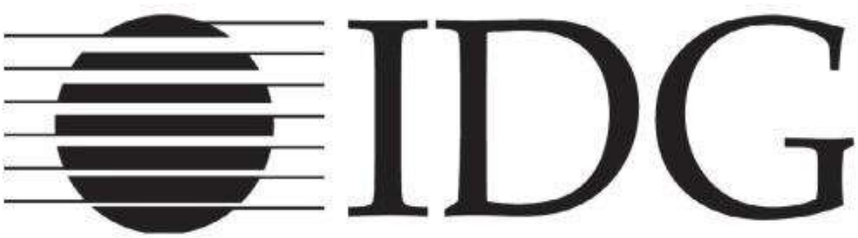
FROM IDG

ZENBOOK DUO UX482 (2021)

ASUS'S EPIC DUAL-SCREEN LAPTOP

INTRODUCING VALVE'S STEAM DECK

PC GAMING IN THE PALM OF YOUR HAND


IDG